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EMERGING TECHNOLOGICAL CHANGES IN BANKING

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ध्येय

संस्थान का ध्येय मूलतः शिक्षण, प्रशिक्षण, परीक्षा, परामर्शिता और निरंतर विशेषज्ञता को बढ़ाने वाले कार्यक्रमों के द्वारा सुयोग्य और सक्षम बैंकरों तथा वित्त विशेषज्ञों को विकसित करना है।

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Dr. J. N. Misra
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"Imagination is more important than knowledge. For knowledge is limited, whereas imagination embraces the entire world, stimulating progress, giving birth to evolution."

- Albert Einstein

Developments in technology has brought about a paradigm shift in banking operations. These tectonic shifts are likely to continue in the years to come. In recent times, banks have embraced several technological improvements, particularly in their operations, customer service and most importantly, product design and delivery.

In the view of above, we have the pleasure to bring the present issue of Bank Quest on the theme "Emerging Technological Changes in Banking". Apart from the articles on the theme, we are also including an article on 13 attributes of effective managers, Micro Research Prize winning articles for the year 2018-19, a Book Review and a summary of a Macro Research Report.

The first article of this issue is written by Mr. Saket Hishikar, Chief Manager (Economist), State Bank of India on "Future of Artificial Intelligence in Banks: A Techno-Commercial Assessment". Mr. Hishikar has discussed adoption of technology and emerging uses of Artificial Intelligence in Banking in this article.

The next article of this issue is penned by Mr. Mainak Banerjee, Learning Head, Baroda Academy, Bank of Baroda on "Data Analytics for Indian Banking". The author has given illustrations of Data Analytics in Financial Services from International & National perspectives along with the important examples of Data Analytics for Indian Banks.

The third article on "13 Attributes of Effective Managers (13 Cs)" is written by Dr. Sharad Kumar, Dean-Academics & Research and Remsons Chair Professor for Management Research, Durgadevi Saraf Institute of Management Studies. Dr. Kumar has interestingly defined the attributes of effective managers in 13 'Cs' viz. Communication, Confidence, Competence, Commitment, Curiosity, Creativity, Collaboration, Courage, Clarity, Compassion, Candid, Conscience and Courteous.

In addition to the above articles, we are also publishing an article on "Crypto Currencies/Blockchain and the Banking System" written by Dr. Bhupal Singh, Director, Monetary Policy Department, Reserve Bank of India (RBI) and Mr. Shashi Kant, Research Officer, Department of Economic and Policy Research, RBI which was awarded the I Prize under Micro Research Paper Competition, 2018-19. Incidentally, this article is on the theme of the present issue of Bank Quest. According to the author, while there are significant constraints of virtual currencies replacing physical currency, the block chain technology can be explored in areas such as international

trade, trade finance, cross-border remittance transfers, besides plugging leakages in social benefit transfers in low income countries.

The next article on “Exchange Rate Volatility and its Macroeconomic Implications: Empirical Evidence from India” is written by Ms. Aswathy Rachel Varughese, Economist, Manager, Canara Bank and was awarded the II Prize under Micro Research Paper Competition, 2018-19. This article attempts to delve into the exchange rate volatility episodes in India pre and post financial crisis (2000-2018). It also empirically investigates the Macroeconomic implications on exchange rate volatility using Johansen Co-integration and Vector Error Correction Model (VCEM).

The sixth article of this issue, “Bumpy Road for Payments Banks Regulatory Compliance and Competition Concerns Over Breakeven” was awarded III Prize under Micro Research Paper Competition, 2018-19 and is authored by Mr. Bibekananda Panda, Chief Manager (Economist), State Bank Staff College, Hyderabad and Dr. Pradeep Kumar Pattnaik, General Manager & Director, State Bank Institute of Consumer Banking, Hyderabad. This articles gives us insights about the performance of Payment Banks in India and suggests alternate Revenue Models for these Banks.

We are also carrying a summary of the Macro Research Report (2015-16) on “A Study on Risks from Foreign Currency Exposure of Small & Medium Enterprises (SMEs) and their impact on Banks”, by Dr. Akhilesh Tripathi, Assistant General Manager, State Bank of India.

In addition to the above, we are also including a Book Review on the book “Systemic Risk and Macroprudential Regulations - Global Financial Crisis and Thereafter”, written by Dr. Rabi N. Mishra, Executive Director, Reserve Bank of India and reviewed by Mr. Brij Raj, General Manager & Banking Ombudsman, Reserve Bank of India, Patna.

I hope this issue will ignite sparks of imaginations in your minds. I wish the coming festive season brings joy, happiness & prosperity for all.

Dr. J. N. Misra



Future of Artificial Intelligence in Banks: A Techno-Commercial Assessment

 **Saket Hishikar***

Introduction to Artificial Intelligence

Artificial Intelligence (AI) is a field of computer science that tries to recreate human intelligence in machines. In lay man's terms, AI tries to perform tasks which at the moment humans can do easily but machines cannot. For example, Microsoft Word cannot write an essay by itself. But it is possible in future to create an algorithm that generates an essay on any topic of choice. Such an algorithm will be AI driven, replicating the human creativity. AI encompasses many sub-fields such as machine learning, Natural Language Processing (NLP), data mining, automated reasoning, computer vision and robotics.

AI can be interpreted in two ways depending upon the level of intelligence achieved. General AI (G-AI) refers to that stage of AI wherein a machine can perform all the tasks that humans can including complex ethical decision making. As against G-AI, the narrow AI (N-AI) is that level of AI wherein a machine performs a well-defined task, to achieve a well-defined output with minimal human interface. Thus a machine driven process for loan sanction falls within the domain of N-AI.

The N-AI can also be divided into two branches – the 'rule based approach' and 'neural network approach' – to AI. The former tries to create intelligent machine by feeding all the knowledge known to humans. The latter however tries to replicate human brain

and its architecture. Neural network approach feeds the available data, leaves the computer to discover patterns and make decisions. Hence, a neural network has four parts – a narrow domain, a clear goal, a robust algorithm and a large data set.

AI is not a new field. The fundamental research in AI can be traced to as early as mid-1950s. The present rush to use AI (mostly the neural networks) - in fields such as banking - is only an application of existing body of fundamental research over the last 50 odd years. Specifically, N-AI has become commercially viable because of 1) explosion in data due to rapid adoption of digital technology, internet and mobile phones (often called the big data) and 2) sustained improvement in computing power, allowing faster churning of data to derive new insights.

The commercial deployment of AI is expected to happen in four stages. Eminent AI scholar Dr. Kai Fu Lee identifies four waves in future adoption of AI namely – the internet AI, business AI, perception AI and autonomous AI.

The internet AI utilises user's behavioural data to optimize/customize user experience for various web based applications (such as payment apps). The business AI, on the other hand, is restricted to business applications in manufacturing and services by utilising the vast in-house structured data amassed using the enterprise management

*Chief Manager (Economist), State Bank of India.

software. Business AI will data mine the in-house data to optimise business process. The perception AI imparts machine the ability to see and hear. The face recognition technology, internet of things (IoT) and NLP fall under this wave and will considerably merge the online and the offline world.

Lastly, the autonomous AI will alter the landscape of the physical world. Machines (e.g. self-driving cars, drones and advance industrial robots) will perform task autonomously without human intervention.

Technology adoption in banking

The use of technology in banking is not new. The primary motivation for use of any technology has been to excel in use for customers, support business process and increase business volume. Starting with telephone in 1920, to adoption of punch cards in 1930-1950 and the use of third generation IT systems such as IBM360 in 1960s; the initial thrust to use of technology in banking up till 1970s was to improve the performance of back office. However, after 1970, technology adoption in banking moved to the front office with deployment of ATMs, pass book printing machines etc.

By 1996, banks across the world adopted the new operating system technology. The spread of the internet and personal computers paved the way for internet banking in mid-2000s. There is now an increasing dependency between banking business and developments in information technology. Since banks today mainly process and exchange data with their customers, this dependency will be even closer in future. By 2010, widespread use of smart phones, and advancement in computing and storage technology such as the clouds has raised hopes of a paradigm shift in use of technology in banking, particularly through application of AI.

In India, the technological transformation of banking started during First Generation Banking Reforms in 1993. This transformation was enabled by implementation of core banking solutions in 2000, followed by deployment of ATM machines and launch of internet banking. By 2009, internet access through mobiles devices outpaced the fixed line connection. In response, banks diverted their attention to financial inclusion through mobile banking. Demonetization gave a further impetus to use of technology in payments domain and banks have invested resources in payment gateways, POS, chip based ATM/Credit cards and online platforms for faster loan processing.

The use of core banking over the last two decades, digitisation of front offices and internet/mobile banking has created a sizable internal database for Indian banks. The enterprise management systems and customer relationship management systems of the banks capture well-structured data on both voluntary (i.e. data mobility) and autonomous (i.e. data motility) aspects of internal process; customer preferences and inter-temporal behaviour. Using distributed data base management techniques, this internal data can be mapped to other externally available datasets for better market intelligence and product development.

Although no credible study has estimated the quantum of data available with Indian banks, comparable studies in China do give a sense of the untapped potential. It is estimated that in 2014 Industrial and Commercial Bank of China had over 4.9 petabytes (PB) of internal data while Agricultural Bank of China generated around 100 TB of structured data and 1 PB of unstructured data in same year.

Today, Indian banks are in various stages of use of technology. The top ten banks are clearly in a

position to deploy emerging AI technologies on small to medium scale in some or the other domain. Yet, it is important to recognise that mere existence of a technology and potential for application does not imply immediate/successful deployment. This is particularly true for AI on two counts. First, various sub-technologies of AI are not in same stage of life cycle of development. Gartner's Hype Cycle for Artificial Intelligence, 2018 forecasts that AI technologies such as deep learning, chatbots, predictive analytics may reach plateau of productivity (POP) in next 2-5 years while the AI governance, digital ethics, NLP and prescriptive analytics may take 5-10 years to reach POP.

Second, unlike the previous waves of technology in banking, the use of AI in banking will give rise to ethical and privacy consideration. Bank will have to ensure that its individual customer service standard are not diluted due to exorbitant automation using AI or due to unintended algorithmic bias that may creep into its AI algorithm. This factor may reduce the pace of AI deployment, particularly in front offices.

Emerging uses of AI in banking

Above survey clearly demonstrates that application of AI, particularly N-AI, in the domain of banking is gaining grounds. It is expected that commercial deployment will be achieved in 5-10 years depending upon the type of sub-technology and banking domain in question. The survey also establishes that in terms of stages of evolution of AI, banking has already embraced internet AI and business AI. Some of the quick deployment is expected in these stages of AI. The perception AI (such as facial and voice recognition) and autonomous AI technologies are in initial stages of development and can see exploitation in next 10 years.

Furthermore, if past history of technology adoption in banking is any guide to future, then banks will possibly embrace business AI first in back office before rolling out its full use in the front office where social quotient is higher than in back office. This will be particularly true for Indian banks. However this does not prevent use of data from front offices to guide decision making. Thus progressive use of AI from back to front office will be along the four waves of AI adoption punctuated by evolving norms and standards on digital ethics, privacy and governance.

Indian banking today faces numerous challenges. A survey of the possible applications of AI in banking are discussed below, principally with reference of state of affairs in Indian banking.

- **Credit appraisal:** Banks in India have been advised from time to time to upgrade their methods of credit appraisal to contain the risk of NPAs. Using deep learning, AI can be used for credit appraisal. Retail loans, credit cards and MSME which are generally managed at portfolio level (as against large corporate), AI technique has evolved at an advanced level to generate better classification and early warning. Ability to capture highly non-linear relationships is a major plus point of deep learning over traditional scoring methods. However, whether AI can be used for credit appraisal for large corporates is not very clear.
- **Anomaly detection:** Anomaly detection is the process of finding patterns in a dataset whose behaviour is not normal or expected. This general term subsumes statistical solution for problems such as banking frauds, money laundering; network intrusion such as cyber threats and data theft, internal audits supports and compliance. AI techniques for anomaly detection involve use of

statistical techniques such as k-Means clustering analysis, neural networks (both supervised and unsupervised) to generate possible cases of anomaly. The use of AI can reduce the detection time for frauds and money laundering, allow counter defense for cyber-attacks and data thefts. Use of NLP and text mining techniques can aid in advance preparation for audits and checking regulatory compliance e.g. KYC.

- **Treasury & Risk management:** Deployment of AI in treasury and risk management function is perhaps the most intuitive and radially achievable. The availability of high quality internal and external data is the strongest point in favour of AI in this domain. Machine learning can be used to dynamically optimise the risk weighted assets of the banks. Automation of back testing of models for market, credit and operational risk is also possible. Techniques of predictive analysis can be used by the treasury for taking sharp market calls. In portfolio management, AI and machine learning tools are being used to identify new signals on price movements. For large banks, AI techniques can help in faster portfolio adjustments such as duration reduction, while ensuring minimum impact costs due to large market position.
- **Branch/ATM network optimization:** The flow of data from branches and ATM network of the banks provides a rich test bed for experimenting with AI techniques. Predictive modeling techniques can be deployed to forecast footfalls at bank ATM on a dynamic basis. The same ATM flow data when mapped with individual behaviour data can create highly customized service to forewarn specific customers about ATM outages. Branch footfall data collected using computer vision technology along with spatial data, such as remote sensing data of ISRO, can be used to optimise the branch

network in terms of accessibility from residential areas, industrial areas etc.

- **Customer servicing:** As noted above, although the use of AI in front offices is currently limited, application such as chatbots are being tested. Chatbots are virtual assistants that help customers transact or solve problems. These automated programmes use NLP to interact with clients in natural language (by text or voice), and use machine learning algorithms to improve over time. Chatbots are being introduced by a range of financial services firms, often in their mobile apps or social media and some can also be made available through ATMs and kiosks. While many are still in the trial phase, there is potential for growth as chatbots gain popularity among the younger generations, and become more sophisticated. However, due to lack of quality data on India's diverse languages, challenges exist for the Indian banking sector to fully use this AI technology.

Discussions and way forward

The present system of fractional banking emerged in the backdrop of industrial revolution in Europe in 1600s. The financial and technological innovations that the system underwent subsequently such as the investment/universal banking models was in response to various waves of industrialization that followed. Today industry itself is at the cusp of a major transformation as it enters the fourth phase of evolution, often dubbed - *Industry 4.0*. Thus banks have very limited choices but to respond to this transformation. The moot question is how and in what way? What are goals and priorities *vis-à-vis* this technological disruption?

The first order impact of AI adoption, which has been the subject matter of this essay, highlights both transformative and disruptive impact of AI on

banking operations and the proven business models in banking. But in all likelihood, AI will emerge as a General Purpose Technology having far reaching consequences for all the sectors of the economy. Thus any exploration into future of AI in banking must not stop at the first stage alone.

The retirement of large cohort of workforce in next five years creates room for incremental investments in AI related technology to boost productivity. A government policy which encourages leveraging AI not only for economic growth, but also for social inclusion is also an enabling factor.

But at the same time, absence of a home grown AI ecosystem limits scope for AI adoption in banks. With hardly any Indian presence in cloud business

or proven AI technology for Indian conditions, banks run the risk of third party dependency in respect of proprietary AI algorithms. Needless to mention that after Supreme Courts dogma in *Justice K. S. Puttaswamy (Retd.) and Anr. vs Union of India and Ors*; the issues of privacy cannot be neglected.

In conclusion, future adoption of AI in Indian banking will not just be strategic decision but a fine balancing act between customer expectations, competition, privacy laws and cultural values. Bank being a service system, dealing with technology-induced changes predominantly depends on a bank's employees. The constructive and devastating potential of AI makes employees the ultimate deciding factor in successful use of AI in banking.



भारतीय वित्तीय प्रौद्योगिकी एवं सहबद्ध सेवाओं (आईएफटीएएस) की संगठनात्मक पुनर्रचना

भारतीय वित्तीय प्रौद्योगिकी एवं सहबद्ध सेवाओं (आईएफटीएएस) की स्थापना बैंकिंग प्रौद्योगिकी विकास एवं अनुसंधान संस्थान (आईडीआरबीटी) ने रंगराजन समिति (2009) की अनुशंसाओं के अनुपालन में की। इसकी स्थापना फरवरी 2015 में कंपनी अधिनियम, 2013 की धारा 8 के तहत गैर-लाभ कंपनी के रूप में की गई। आईएफटीएएस रिज़र्व बैंक, अन्य बैंकों तथा सहकारी समितियों को महत्वपूर्ण इन्फ्रास्ट्रक्चर सेवाएं (अंतर-बैंक/

जीएसटी/केंद्रीय एवं राज्य सरकारों के भुगतान एवं प्राप्ति के लेनदेन से संबंधित इनफिनेट एवं एसएफएमएस) प्रदान करता है। आईएफटीएएस टाटा कंसल्टेंसी सर्विसेज (टीसीएस) द्वारा विकसित एनईएफटी एप्लिकेशनों के संबंधन में सेवा प्रदाता के रूप में भी कार्य करता है। रिज़र्व बैंक ने अपने प्राधिकृत प्रतिनिधियों के माध्यम से आईएफटीएएस में 100 प्रतिशत इक्विटी शेयर अधिगृहीत किए हैं।

स्रोत: वार्षिक रिपोर्ट, भारतीय रिज़र्व बैंक



 **Mainak Banerjee***

Data Analytics for Indian Banking

Introduction

In June 2018, Bank of Baroda announced collaboration with Accenture to power its Analytics Centre of Excellence. The Bank planned to establish a data and analytics technology platform with an enterprise wide petabyte scale Big Data Lake, powered by leading data technologies and techniques such as predictive analytics, machine learning and artificial intelligence. The Bank expected benefits of increasing average product holding, improving collections efficiency, preventing frauds and enabling more robust monitoring and tracking of business operations across the management hierarchy out of this initiative.¹

It's not the first time that an Indian Bank has explored the data analytics avenue towards improving its business efficiency. With information overload, more and more data are being generated daily-amount of which could not be imagined a decade back. Indeed, around 90% data in the world has been generated in the last 2 years itself! ² Data Analytics has emerged to account for as well as utilize this massive source of information.

What is Data Analytics?

There are certain terminologies that are often used interchangeably in data analytics practice. They include Big Data, Data Analytics, Data Science etc. Additional important terminologies include Data Mining, Data Lake, Data Warehouse etc.

Without going into too much technical detail, we can

summarise by saying that the primary objective of any analytical function is to explore data for drawing insights.

Data may be in many forms viz. structured, unstructured or semi-structured.

- Structured data may be stored in tabular formats e.g. description of monthly salary of 180 employees of an organization being maintained in MS- Excel.
- Examples of unstructured data include video and audios, which it is not possible to analyze directly. This data has to be structured beforehand.
- Examples of semi-structured data include MS-Word, text files, Portable Document Format etc. They are not tabular in nature but converting them to tabular format is easier as compared to unstructured data.

For any analytics function, the initial step is to prepare data in a machine readable, structured form and then retrieve that as per the users' requirement from storage. Data Engineering is the term to denote activities related to this enterprise.

Conventional data storage and retrieval process is having limited capability to manage today's data flow (Just some illustrations to highlight this- every minute Google processes more than 240,000 searches, we send 16 million text messages and Uber riders take 45,788 trips!³) and as a result new techniques have evolved. It may store data at multiple servers

*Learning Head, Baroda Academy, Chennai.

in a distributed manner towards its routine retrieval. Another alternative for handling big data is cloud computing.

After storing and retrieving data, analyzing the same is the next step. Multiple statistical techniques like linear regression, decision tree, support vector machine, logistic regression etc. are utilized for “Predictive Modelling”, which may also be known as machine learning- a subset of Artificial Intelligence. Earlier humans used to develop predictive models, but now with the unprecedented growth in computational abilities- it is machines which develop predictive models in self-learning mode. Predictive models are basically made of complex mathematical functions and equations.

Output is generated by these predictive models. These outputs are populated in dashboards for visualization. Earlier, these were termed as business intelligence, but are now considered as part of Data Analytics (Science). These insights may be shared with business units for adding value to their operations. Diverse utilities of these data insights would be explored in the upcoming part of this article.

Features utilized to characterize big data are as under:

- a. **Volume:** As already mentioned before, data is being generated at a volume today that could not be imagined even a decade back. Traditional storage mediums are inadequate to support today’s data volume.
- b. **Velocity:** Given that multiple times of previously known quantities of data are being generated in a consistent manner within the same (sometimes lower) time frame, it needs to be transmitted, processed and analyzed in a compounding manner as well.
- c. **Variety:** Initially humans used to process written data on documents, that gave way to information being stored in computers in text files,

spreadsheets etc. Data Analytics often depend on diverse categories of data.

Dissimilar types of data are continuously being generated from multiple sources as on date, making their processing more difficult. Image files, audio records as well as video clips may prove to be more important data sources than traditional means in future.

- d. **Veracity:** Quantity of data doesn’t guarantee its quality. With increased generation of data, the risk of junk data being considered for processing and decision taking only gets higher. Data Analytics strives to find a solution towards removing clutter and focus on meaningful data.

Illustration of Data Analytics being utilized in Different Areas - Internationally

Several Fortune 1000 companies have reported success on big data business initiatives as under- ⁴

Initiatives	Started	Success
Decrease expenses through operational cost efficiencies	72.6%	49.2%
Establish a data-driven culture	69.4%	27.9%
Create new avenues for innovation and disruption	64.5%	44.3%
Accelerate the speed with which new capabilities and services are deployed	64.5%	31.1%
Launch new product and service offerings	62.9%	36.1%
Monetize Big Data through increased revenues and new revenue sources	54.8%	32.8%
Transform and reposition your business for the future	51.6%	27.9%

The above also summarises the broad contours of application of data analytics.

Numerous examples are available of businesses using big data for their advantage. Some illustrations are as under-

- a. Coffee giant Starbucks is involved in around 90 million transactions a week in its 25000 stores worldwide. Using these details, they analyze buying pattern of their customers and combining this information with other data like weather, promotions, inventory, insights into local events etc. they are able to deliver better personalized service to other customers, even when an existing customer visits a new store for the first time. Data could be used to up-sell customers in a more targeted and efficient manner, apart from opening stores and even weather pattern analysis.⁵
- b. Red Roof Inn, an economy hotel chain, utilized this technique to target specific set of people that were very likely to convert. They targeted people stranded from cancelled flights, since many of their Inns are located next to busy airports. In US, about 90,000 passengers get stranded a day. Red Roof Inn created a proprietary system to leverage flight cancellation data, along with other data like weather and time of day, to figure out who is looking for a hotel because they are stranded at the airport. Red Roof then pays to appear in their searches for hotels with exact information about how far Red Roof Inn is from the airport and customized messages about being a place to stay when stranded.⁶
- c. Delta Airlines, a major United States Airline, utilized this technique for a targeted recognition feature by their flight attendants. They've developed an app that helps pilots avoid turbulence for a more comfortable flight.⁷
- d. Some hospitals in Singapore identify patients who are likely to require frequent admissions and reach out to offer preventive or early interventions that will keep their conditions stable. This reduces

their need to be hospitalised. It is possible to collect and combine healthcare, social and economic data and analyse them for insights.⁸

Illustration of Data Analytics being utilized in India

Utilization of Big Data and Data Analytics may be observed in several Government and private organizations in India. Some examples are as under:

- a. A Round Table Conference on “Data Analytics for Indian Railways” was inaugurated by the Minister of Railways in May 2017. It was discussed there that Indian Railways is one of the largest Data creators in the world. Large amount of data are available in different aspects of the Railways working such as Passenger Ticketing, Freight Operations, Crew Management, Track Maintenance, Rolling Stock Maintenance (Locomotive as well as Wagon and Coaches), Expenditure Accounting etc. Data Analytics can help Railways in determining pricing of services, planning train operations on various routes, proactive safety measures and disaster management, predictive maintenance of assets to avoid failures etc.⁹
- b. Income Tax Department is another important user for Data Analytics. While 1.06 crore new people filed income tax returns during 2017-18, the Department is planning to include 1.25 crore more in the current fiscal. The Systems Directorate, Directorate of Intelligence and Criminal Investigation, Investigation Wing and TDS/TCS charges etc. engage in data mining and data analytics to identify potential tax payers. The department is also utilising big data to increase collection from international taxation, apart from identifying benami transactions etc.¹⁰
- c. Modern police force is using advanced analytical tools to bring down crime rates and predict criminal activities. Another important use of AI in modern policing has been social media analytics. The police are actively using video analytics in

Intelligent Traffic Management System, where careful analysis of video footage is used to book offenders and better understand road conditions.¹¹

- d. Operation Red Alert from My Choices Foundation, a Hyderabad based non-profit organization, is a prevention programme designed to help parents, teachers, village leaders and children to understand how the traffickers work so they can block their efforts. As a pro bono project, the Australian analytics firm Quantum developed a big data solution that runs on Cisco UCS infrastructure and uses the MapR Converged Data Platform. The solution analyzed India's census data, government education data and other sources for factors such as drought, poverty level, proximity to transportation stations, educational opportunities, population, and distance to police stations to identify the villages and towns that are most at risk of human trafficking. Red Alert gathered 40 NGO partners towards conducting the Safe Village education program in 600 villages throughout four states in India, reaching over 600,000 village. Red Alert was also instrumental in creating India's first national anti-trafficking helpline, and is conducting mass media awareness campaigns.¹²
- e. All of you must be familiar with huge campaigns being run by different e-commerce portals from time to time. They regularly use data analytics and algorithm to help the sellers get better insights into their business. They may offer customised portal to their sellers to help stock up relevant products. They may offer insights on demand on specific materials from Customers based on their web surfing pattern, search history as well as multiple other factors.²⁷

Illustration of Data Analytics in Financial Services- International Scenario

By this time, you must have realized the abundance possible usage out of Data Analytics. The Financial Services industry remains one of the biggest users of Data Analytics. Some illustrations for the same is as under-

- a. The Royal Bank of Scotland utilizes this technique for customer complaint resolution. Bank initiated customer feedback is accessible to the entire organization towards prioritizing investment spend as per their Customers' preferences. They use a technical platform for analysis of very large datasets through an intuitive interface. Data is considered as a key component of decision making. The Bank is also engaged in developing new scalable digital data services that are for simplifying customer experiences.¹³
- b. Turkey's second largest private Bank, Garanti has launched an AI-based virtual assistant in its mobile app. With the help of this assistant, customers can perform almost all of their banking transactions and inquiries using voice commands. Data is analyzed to recommend relevant products and services and provide valuable insights.¹⁴ Their iGaranti app enables users to receive offers from preferred stores as they move around. The app includes a budgeting feature that relies on learning a customer's spending pattern. The app may offer overspending alerts as well as small short-term loans for times when customers exceed their budget.¹⁵
- c. UK's Lloyds Banking Group has applied advanced behavioural analytics and intelligent machine learning techniques. It is possible to gather intelligence from millions of daily consumer interactions including logins, payments, and new

account applications across thousands of global businesses. As a result a unique digital identity for each user may be created by analyzing the myriad connections between devices, locations, and anonymous personal information, alerting businesses to any high-risk deviations. The group was able to detect and block more than \$250000 worth of genuine fraud attempts within one month while reducing false alerts. Their Machine Learning technology employs an iterative approach to adapt to changing customer behaviours over time.¹⁶

- d. Wells Fargo & Co. utilized predictive analytics in its selection process. Their predictive model is based on balancing the need to choose the top performers while minimizing turnover. The tool has also assisted in defining the best “success indicators” so that it could be more proactive in its recruiting efforts.¹⁷
- e. Integration of a Bank’s systems with that of its customer could be a critical factor. Spanish multinational commercial bank and financial services company Santander Bank worked on big data architecture towards resolving this issue, by organizing the logical order of information transferred to the data lake, the unification of data lakes across all countries, and traceability of data etc.²³ Regulatory compliance remains an area where data analytics must contribute in an increasingly volatile world economy.

Examples of Data Analytics for Indian Banks

Several Indian banks have already initiated data analytics initiatives. Some examples are as under-

- a. HDFC Bank was able to scale to large datasets and build models using high-performance parallelized RevoScaleR algorithms. The Bank provided a seamless loan application experience as well as quick turnaround on loan dispersals for customer’s Demographic, geographic, and other

data are utilized to augment loan applications and credit analysis. Instead of data manipulation, preparation, and governance the Bank may focus on models, develop algorithms, streamline updates, and create new innovations in customer services.¹⁸

- b. Axis Bank automated the assignment of scores based on risk and other propensities in their consumer lending business. The Bank expected that the scorecard driven underwriting would result in better accuracy, consistency and lower credit costs. Analytics is utilized in their marketing campaigns. The Bank is also concentrating on data from Internet and mobile banking, social media etc. towards improved customer service by understanding their customers’ challenges. The Bank plans to incorporate fraud analytics as well.¹⁹
- c. State Bank of India’s Data Warehouse is one of the largest in the world. Data are collected from multiple sources. Operational CRM is utilized to generate data and pass it on to the backend and Analytical CRM is involved for further evaluation. They try to identify the next best product to sell to the customer’s NPA identification in advance and recovery exploration in geographic or demographic terms may be carried out. Lead generation as well as identification of premature closure tendencies is conducted through data analytics by the Bank.²⁰
- d. Last year, ICICI Bank equipped 2000 managers with design thinking and data analytics skills.²¹ The Bank has been utilizing data analytics for multiple activities and it was declared winner in the ‘Best Use of Data Analytics’ category at the Retail Banker International Awards 2018-organised by Retail Banker International, an online publication that provides news on banking and finance from across the globe. The Bank was also declared runner-up in ‘Best Use of Analytics

for Business Outcome' category during the IBA Banking Technology Awards 2018.²²

- e. Kotak Mahindra Bank's analytics platform extracts data from its core banking system and the relationship management system, combines them and puts in place algorithms which are working on certain thresholds. The bank implements various significant events like change in demographics viz. marital status, city, transactional pattern viz. significant credit/debit, premature withdrawal of term deposit, stop in any regular activity viz. auto-pay, standing instructions/ECS, drop in transaction value or volume throughputs across a period vis-à-vis historical trend and payments to beneficiaries like securities, builders, dealers. These details are shared with Relationship Managers of the Bank for identifying business opportunities. The Bank has identified that a meeting led through cues from data analytics tools is 3 times more effective than the random meetings scheduled by a Relationship Manager.²⁴

Future Potential and Conclusion

Core banking solution was considered as the last major disruption in Indian banking, apart from usage of digital banking channels during the last decade. Data analytics and big data concepts may change all that. Financial institutions gather massive data about their Customers, often on a real time basis. Only in the past decade, analysis started on proper utilization of this data.

Apart from the instances as already mentioned above, data analytics may be used for:

- Sentiment Analysis: It is possible by monitoring customers' opinion, examining customer feedback etc.
- 360 Degree Analysis and Customer Segmentation: Customer profile and product engagement may

be monitored through this approach.

- Developing Customers: Through data management potential, new customers may be identified.
- Comprehensive Capital Analysis and Review: This is an example of data analytics being used for Regulatory Supervision upon the Banks themselves.
- Risk Profiling for Customers: This is another technique being adopted by Banks for suggesting appropriate products to their Customers.
- Stress Testing: This is another technique being adopted by Regulators. Certain banks may conduct the exercise on their own as a part of risk management practices.
- Customer Churn Analytics and Win back Propensity Modelling etc.

These are some of the present usage of data analytics. Several banks now employ Data Analytics Officers on a full time basis and the practice of outsourcing has also started. This is an evolving field and new ideas and technologies are continuously being explored. As and when newer avenues emerge, we're likely to see additional usage of data analytics techniques.

Data usage and utility is not without its fair share of dissension. Last year, there was a proposal of monetizing the 100 terabytes of user data that is generated each year by IRCTC.²⁵ Banking being a fiduciary business, access as well as utilization data is a matter of concern that Banks should consider about. Security of these massive data is another primary consideration and merits as much investment as for its analysis.

Nevertheless, advantages of data utilization and accessibility may far outweigh its disadvantages. Competition and Markets Authority on behalf of the UK Government set up the Open Banking concept

more than a year back and it is having the biggest providers of financial services as its member²⁶ Customers and Service Providers may both gain from such a scenario.

While the concept of open banking may seem too revolutionary for India at this point of time, it may be kept in mind that existing Stand Up Mitra Portal, Vidya Lakshmi Portal as well as PSB Loans in 59 Minutes Portal encourage the beneficiaries to share their details with a number of service providers at a single point of time towards advantage to the Customer as well as to encourage competition among the Banks. With increased data processing capability, Banks are likely to be more attentive towards Customers' heterogeneous requirements. Increased competition is expected to result in better customer service as well as a whole new bouquet of options for the Customers.

Gone are the days of impression and intuition based banking. With passage of time quantitative and qualitative analysis gained new dimensions that could not be imagined a decade back. With amount of data as well as our capability to process the same being increased in a compounding fashion, sky is the limit for future adoption of data in banking business.

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Big Data Analytics: Disruptive Technologies for Changing the Game by Dr. Arvind Sathi (accessible at ftp://public.dhe.ibm.com/software/pdf/at/SWP10/Big_Data_Analytics.pdf)

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13 Attributes of Effective Managers (13 Cs)

 **Dr. Sharad Kumar***

In the era of volatile, Uncertain, Complex and Ambiguous (VUCA) business environment and with disruptive players entering into the business with new and innovative solutions, the businesses are becoming more and more vulnerable and challenging. Past success cannot guarantee future success. Organisations can replicate each and every aspect of business input like capital, technology, infrastructure, systems and processes but not the people, as every individual is different with different aptitude, abilities, personality traits, mental, emotional and temperamental frameworks. The managers have to therefore play more strategic role to swiftly adjust to the volatile environment and to adopt innovative approaches to deal with uncertainties. The technical skills learnt at B-schools become obsolete soon. There are certain personality/temperamental traits and behavioural attributes which are required to successfully deal with and manage the challenges. These behavioural attributes have been described in terms of 13 Cs which are required for managing business effectively. These characteristics are universal and do not get obsolete with changing business environment.

The **first** and foremost attribute is effective **communication**. It refers to expressing clearly and understanding others unambiguously. It is the most important Inter-personal skill which is required by the manager. An effective communication is an art to lead the team and motivating its members to achieve business goals. It also helps the managers to manage

the conflicts and dealing negotiations.

The **second** important attribute to drive the business in an adverse scenario is **Confidence**. It reflects the self-belief and self-assurance. The great people who have bounced back from the adverse situation had the confidence and belief in their ability to deal with a difficult situation. With their self confidence, they have converted the weakness into the opportunity.

The **third** important attribute which help in driving the business results is **Competence**. It refers to proficiency to perform a job or task. It is the ability to handle a business situation which requires both knowledge and skills. It is required to be updated on a continuous basis. The learning can take place both at conscious and subconscious level with exposure to new ideas and methods.

The **fourth** behavioural attribute required to drive the business successfully is **Commitment** which refers to dedication to duties and responsibilities. A committed person always sees beyond his/her self interest and puts his/her best to achieve the goals.

The **fifth** essential attribute for the success is **Curiosity**. It refers to inquisitiveness to learn to gather new knowledge and develop new skills. The curiosity to learn and know what is happening around always adds to the knowledge about the new idea and the changes in business environment.

The **sixth** attribute which has become essential in the disruptive business environment is **Creativity**.

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It refers to inventing and experimenting new ways and to discover new products and services by leveraging new technologies. Many of the Start-ups have disrupted many well established businesses by bringing new innovative products with this ability.

The **seventh** important attribute the managers should possess is **Collaboration**. It refers to developing synergy, team work and leveraging mutual strengths. A collaborative work environment is more productive. The collaborative environment is created and nurtured by the managers through mutual trust, honesty, empathy, sacrifice and mutual respect.

The **eighth** managerial attribute which is in a great demand is **Courage**. It refers to the Risk-taking ability and fearless attitude. Unless a manager is prepared to take risk, the outcome will be sub-optimal. The fear factor prevents the managers to try new and innovative ways of doing their job.

The **ninth** desired attribute of a manager is **Clarity**. It refers to clarity of thoughts, clarity of goal, clarity of role and self-awareness. The managers are required to minimise the ambiguity and should be clear and focussed to their goal and role. They should be clear about their strengths and limitations.

The **tenth** desirable attribute a manager should possess is **Compassion**. It refers to concern for others, taking care and kindness. A manager has to take care of his colleagues, customers and should be responsible for the society at large by sincerely addressing their needs. He/she should be empathetic to all the stakeholders and should have helpful and service-oriented attitude.

The **eleventh** attribute a manager should possess

is being **Candid**. It refers to being frank, truthful and straight forward. Managers are required to freely and frankly express themselves and share their views. Often, a junior manager does not open up before the seniors and hesitates to express his/her views if it is different or contradictory to the views of the seniors even if he/she has some valuable information/ view.

The **twelfth** attribute of a successful manager is his/her **Conscience**. It refers to ensuring integrity, morality, ethical behaviour and self-control. The conscience and ethical behaviour have become necessary for long-term success and for gaining self-respect and trust. A manager can be role model only if he/she displays conscience behaviour.

Last but not the least, the **thirteenth** attribute of a manager is being **Courteous**. It refers to being well-mannered, respectful and sober. The courteous behaviour makes the personality of the manager attractive and charming. The colleagues, customers and other stakeholders are always happy to interact with such managers.

To sum up, the above-mentioned behavioural attributes of the managers are extremely important for the successful execution of his/her job. The recruiters should look for these attributes in the candidates while selecting a manager. The organisations can also focus on development of these attributes through the training and development programs for the existing managers. The managers who possess these attributes and display in their functioning should be rewarded. These managerial attributes are going to be beneficial for the organisations to drive the results.





 Dr. Bhupal Singh*

Crypto Currencies/ Blockchain and the Banking System



 Shashi Kant**

Abstract

With the nascent stage of development and application of blockchain technology to modernise payment infrastructure, cost effectiveness and efficiency aspects related to its use remain key challenges. Price volatility and scalability issues also raise concerns about the suitability of virtual currencies (VCs) as efficient and effective payment instruments, particularly in the developing country context. While there are significant constraints of VCs in replacing physical currency, the block chain technology underlying their design can be exploited in areas such as international trade, trade finance, cross-border remittance transfers, besides plugging leakages in social benefit transfers in low income countries. While in developing countries, it can be utilized in a variety of economic applications such as creating digital land records, financial inclusion and benefit transfers to low income households, significant challenges persist in terms of internet connectivity, higher cost of transactions, deficits in electricity supply and low levels of financial literacy.

I. Introduction

Fiat money can be attributed to be as one of the biggest inventions in the history of mankind. It changed the way people used to trade and transact, however, using cash for purchases carries the risk of theft. With the advancement of technology, usage of cash is

dwindling and card and internet banking transactions have started gaining traction. For instance, after its launch in Kenya, the mobile money technology has rapidly gained popularity in many countries, given that its use poses lower risks than other informal payment channels. This includes mobile wallets and apps which are linked to bank accounts and can be directly used to make payments.

With the advent of Electronic Fund Transfer (EFT) and Real Time Gross Settlement (RTGS) systems, the turnaround time for payments and settlements has come down drastically. The Distributed Ledger Technology (DLT) which is being heralded as the next revolution sitting round the corner is widely expected to change the payments landscape. It is argued that DLT could fundamentally change the financial sector – address persistent challenges and change roles of financial sector stakeholders to make the system more efficient, resilient and reliable (Natarajan, et al., 2017). One of the reasons for the interest in DLT is that many central bank operated wholesale payment systems are programmed in obsolete languages or use old database designs. Some central banks, notably, Hong Kong Monetary Authority (HKMA) and Bank of France have taken initiatives in developing DLT-based applications. However, the technology is still in its nascent stages as far as its application to modernise core payment infrastructure is concerned. It also remains to be seen how cost effective and efficient

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The views expressed in the paper are those of the authors and do not essentially represent the view of the organization they are affiliated to.

such systems are going to be as they consume too much power and authentication of transactions is a slow process based on trial and error.

Currently, virtual currencies (VCs), notably Bitcoin, Ethereum, litecoins, dogecoins etc. and the blockchain/DLT that underpins them, have found wide media coverage, due to the perceived promise they hold to be the fundamentally disruptive innovations of the 21st century. They have also received attention due to the concerns around their alleged misuse for money laundering/terrorist financing. The underlying blockchain technology, which has attracted much less attention, holds the potential to produce fundamental changes to transform the world of business – reminiscent of how the internet changed the dissemination of information. There are many aspects surrounding the existence of VCs and their potential impact on the economic activities such as payment systems, trade, money transfers that may be of interest to policy makers. The innovations/use cases surrounding the VCs are still unraveling and are yet to withstand the trial of time. Most jurisdictions are in wait and watch mode, neither explicitly prohibiting/banning nor explicitly recognising these. Even among the jurisdictions that have recognised VCs legally, there seems to be lack of unanimity in treating them as asset/security/currency. In this paper, we would focus on why central banks should be concerned about these developments, particularly from an emerging market perspective. We will touch upon the nature of VCs; challenges and opportunities offered by VCs, particularly for the financial sector; role of central banks and scope of central bank digital currencies (CBDC); evolving regulatory architecture for VCs; and finally provide some policy perspective.

II. How is Cryptocurrency different from Central Bank Currency?

Unlike fiat money issued by central banks/authorities, cryptocurrency has limited acceptability in terms of its utility as a digital medium of exchange. It's a

peer-to-peer (private) digital system of payment with the transactions recorded in a public ledger using its own unit of account. One of the most striking features of cryptocurrency is that it weeds out the need for a trusted third party/central authority such as a governmental agency. The rate at which such units are created is defined beforehand and is publicly known unlike the fiat currencies, where the government/central bank controls the supply. Crypto-assets, however, do not meet, or only partially satisfy, the following key functions of money:

- a) Lack of intrinsic value as well as the sharp fluctuations in their value imply that they cannot be used as a reliable store of value. As these are often a product of computing, with no underlying trade/economic needs, they tend to lack intrinsic value, unlike the fiat currency.
- b) As a means of payment/medium of exchange, crypto-assets are far less effective than fiat currencies, in that (i) markedly higher price volatility makes it hard to be used as a means of payment; (ii) high transaction costs entailed in crypto transactions make it unviable for retail payments; and (iii) reimbursement in the event of fraud is not available/ensured, and (iv) very restricted acceptability by merchants.
- c) Given the unusually high volatility observed in top ten cryptocurrencies, very few prices are expressed using them. Cryptocurrencies exhibit such a high order of volatility as these do not have intrinsic value (unlike gold) or external backing (unlike currencies that are legal tender or fiat money). Instead of being based on realistic assessment of future prospects, they exhibit 'classic hallmarks of bubbles' (Carney, 2018).

Since Bitcoins/cryptocoins are poor store of value and inefficient and unreliable media of exchange, they are not fit to serve and as such, do not serve as a unit of account. In view of the above, cryptocurrencies are

viewed not as money, but as cryptoassets – a financial asset. Crypto assets do not have attributes of money and are unlikely to compete with legal tender. They are unlikely to be money in the future as well (Carney, 2018).

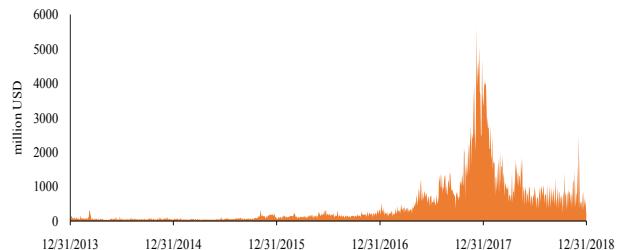
III. Challenges

Cryptocurrencies are exhibited as the biggest innovation of the century, however, they also have the same problems as classic e-payment systems. The key risks can be summarised as:

- a) Trading platforms have been subject to rising cyber-attacks, compromising security. The issues that plague the digital wallets in today's payment ecosystem are also applicable to cryptocurrencies – they too are vulnerable to phishing attacks, user address error, hacking, stealing of cryptographic keys etc. According to the Ernst & Young report, of the US\$ 3.7 billion raised globally via initial coin offerings (ICO), more than 10% or US\$ 400 million were lost as a result of attacks.
- b) Customer/investor protection issue assumes greater importance in developing countries where financial literacy is low, mis-selling is rampant and retail investors tend to follow the herd behavior without fully understanding the risks. As such, there is no established framework for recourse to customer problems/disputes/charge backs etc.
- c) Can be used to disguise (i) the illicit origin or sanctioned destination of funds/tax evasion; (ii) circumvent capital controls and international sanctions; (iii) absence of information of counterparties in such peer-to-peer anonymous/pseudonymous systems could also subject the users to unintentional breaches of Anti-Money Laundering and Combating the Financing of Terrorism (AML/CFT) laws.
- d) The crypto being highly speculative assets, financial stability concerns may arise if the size gathers a critical mass. Bitcoin daily transaction

volumes have exhibited high volatility with total transactions declining from a peak of US\$5 billion in mid-December 2017 to less than US\$ 1 billion at end-December 2018 (Chart 1).

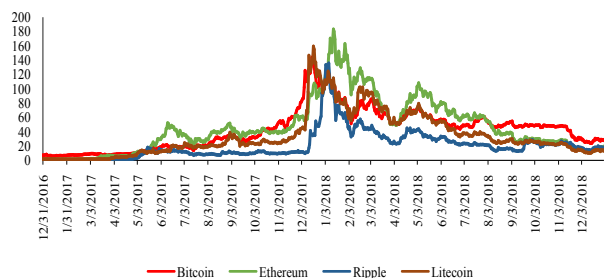
Chart 1: Estimated Bitcoin Transaction Volume



Source: Blockchain.info

On the money laundering and financial stability concerns, in December 2013, the People's Bank of China barred its banks and financial institutions from treating Bitcoins as a currency. In September 2017, China decided to ban Bitcoin trading and initial coin offerings arguing that such activities could pose major financial risks to the economy. Crypto assets and currencies have been highly volatile in the past (See Chart 2). If one compares the recent peak and trough for two major cryptocurrencies; Bitcoin and Ethereum prices have fallen more than five times between mid-December 2017 and end-December 2018. Without any sovereign backing and any regulatory authority, its value is going to be subject to vagaries of speculation and demand supply dynamics. Bitcoins may, however, not disrupt currency landscape as originally anticipated, given the business model and architectural constraints.

Chart 2: Price variation of cryptocurrencies (Index: Jan 1, 2018 = 100)



Source: Yahoo Finance.

Bitcoin also struggles to support high transaction volumes. However, there may be other alternatives which may have higher transaction throughput but they are nowhere near the demands met by traditional transaction e-money processing systems used in retail payment systems in many jurisdictions. Significant vulnerability could arise if a single entity (miner) contributed majority of network's mining activity. Therefore, a number of challenges need to be addressed by the industry. Importantly, the scope of AML/KYC guidelines is to be examined. It is reported that VCs, such as Bitcoins, are being traded on exchange platforms set up in various jurisdictions whose legal status is also unclear. Hence, the traders of VCs on such platforms are exposed to legal as well as financial risks. While crypto exchanges can be made to follow the law of the land, it is difficult to enforce AML/KYC guidelines when an individual makes cross-border transfers from his private wallet using exchanges located in a third country. Every exchange/country may have a different KYC policy. Since virtual currencies enable quick transfers of huge amounts of money, regardless of the location of the payer and the payee, the threshold of permissible cross-border transactions could be difficult to enforce.

Another major challenge is the technical scalability - Bitcoin network can handle 3-5 transactions per second, while the interbank Visa system is estimated to handle 2,500. Moreover, validating a transaction takes around 10 minutes which is too large to be really useful in a practical scenario where hundreds of thousands of transactions may be required to be validated simultaneously. Bitcoin network was expected to overcome current scalability limitations, however, it appears to be entering the flatter part of its supply curve. The cost of mining (verifying transactions) in terms of electricity consumption and carbon dioxide emission burden (both on account of production of electricity and computing equipment) will become economically and environmentally unsustainable if transaction volumes keep growing or, demand for cryptocurrencies increases.

Presently, lopsided investment also poses a challenge as market funding has been predominantly concentrated in developing crypto currency ecosystem, while other applications involving the blockchain technology which could have immense economic/commercial uses, have not attracted much investment. For instance, there has been very little funding in applications such as intra-bank payments, smart contracts, securities and settlements. In order to harness this technology, regulation should develop a conducive architecture for the development of these applications, which will also build trust and reduce uncertainty.

Governance issue reside at the heart of the growth of the industry and the key evolving challenges are:

- (i) **Trust and Predictability:** First, regulation by approving VCs as a means of paying taxes or making financial transactions, would provide wider acceptance to the currency. Further, increased demand for such legitimate transactions can in turn help manage the volatile swings that presently characterize Bitcoins and other VCs. Secondly, regulation will be positive as it will add more legitimacy and allow businesses to have much clearer guidelines when dealing with cryptocurrencies, whereas uncertainty will lead to stunted growth.
- (ii) **Standard setting:** Given a variety of architecture options, standards need to be set for cryptocurrencies. The development of international standards to support privacy, security, identity, smart contract, governance and other matters related to blockchain technology may contribute to repose market confidence in the use and application of the technology.
- (iii) **Infrastructure revamp:** Given the future technological requirements and the scale of operations needed for facilitating economic transactions, the VC ecosystem would require a massive revamp of existing infrastructure. In order to facilitate cross-border transactions, currency conversion infrastructure also needs to be put in

place. The fixed supply rules of cryptocurrencies such as Bitcoins are not their strengths but their weaknesses. For example, the maximum amount of Bitcoins that can be supplied internationally is 21 million units and the ceiling is expected to be reached by 2040. The fixed supply of Bitcoins will necessarily impart a deflationary bias to any growing economy with harmful consequences for real economic activity. The fixed supply of Bitcoins has contributed to the emergence of other cryptocurrencies, which dilute the value of the existing ones (Carstens, 2018).

Notwithstanding the challenges discussed above, the DLT/blockchain technology underlying crypto currencies can be of immense value in the following applications. First, smart contracts obviating the need for manual interventions in a variety of situations where the terms and conditions/transaction performance requirements can be programmed in terms of computer code. Second, it can help in microfinance/financial inclusion by reducing cost of transactions/remittances, reducing cost of compliance (shared KYC/documentation/ information sharing, etc.); delivery of digital entitlements and digital identity to end-beneficiaries and verifiable transaction trails. Third, it can be utilized in rationalising existing registries; creating and managing property rights. Fourth, medical record management - MedRec, prototype using blockchains, is intended to improve electronic medical records; gives patients and their providers one-stop access to their entire medical history across all providers see Ekblaw, et al., 2016). Fifth, facilitating quicker turn around/transaction processing times for multi-party systems such as trade finance, remittance systems and securities clearances and settlements, where each participating entity has clear information about the status of transaction processing in near real time. Sixth, movement of goods and services across a global supply chain (Higgins, 2016; Parker, 2016): Access to trade finance is particularly difficult for small and medium-sized enterprises (SMEs) because they often lack collateral, documented transaction history, and sufficient knowledge of the financial industry. An

ADB survey finds that 57% of trade finance requests by SMEs are rejected (ADB, 2015). The DLT-led diffusion of a company identifier system will facilitate the risk assessment and ownership tracking, helping SMEs in developing countries in accessing finance in global markets.

IV. Crypto Currency and the Banking System

(i) How technology is affecting the nature of money and role of central banks?

Although some countries have taken a big leap forward in the digital payments space, the question of making cash obsolete is still discomfiting for them. The reason is that cash can act as a backstop measure in case the payment infrastructure comes under cyber-attack. Not to mention there are many countries where the high-speed network and decent performing electronic devices enabling the e-currency payment and settlement are still a distant reality. Such countries have a long way to go in establishing a safe infrastructure for payments and educating their users how to use it. A big merit, or demerit as some people might call it, that cash brings along with it is anonymity. The sender of cash does not have to reveal his identity to the party receiving cash, thereby maintaining privacy. The good thing about cryptocurrencies is that they can be designed to provide anonymity and hence provision of anonymity is a conscious decision of the regulator although it may look surprising for a central bank to issue cryptocurrency that provides anonymity. The seriousness of privacy concerns may vary from country to country and therefore, regulators would have to address this issue taking into consideration the local mood.

One of the reasons for keen interest in blockchain/ DLT is that many wholesale payment systems operated by central banks are programmed in obsolete languages or use old database designs (Bech and Garratt, 2017). Although some central banks in countries like Hong Kong, France and Singapore have taken initiatives in developing DLT-based applications, the technology is still in nascent stages regarding its use to modernise core payment infrastructure. It also remains to be

seen how cost effective and efficient such systems are going to be as they consume too much power and authentication of transactions is a slow process based on trial and error. With the availability of many payment options, the primary attraction/usefulness of crypto-assets for payments appears to arise due to its ability to mask the identity of payer and beneficiary, thereby, exposing its misuse for facilitating payments for illegal activities (also see BIS, 2015).

(ii) Should central banks create their own e-currencies?

Before answering the question whether central bank should issue e-currencies, we need to understand its pros and cons. A central bank digital currency (CBDC) would allow consumers to hold central bank liabilities in digital form. The first and foremost benefit that one can think of is that it would be a nearly costless medium of exchange where there are no printing costs involved. A recent study pointed out that the introduction of CBDC would facilitate more rapid and secure settlement of cross-border financial transactions (He, et al., 2016). Central bank e-currencies would discourage tax evasion, money laundering, and other illegal activities that are made easier by paper currency (Rogoff, 2016). This benefit is important for developing economies where a large fraction of economic activity is conducted using cash, and incidence of tax evasion is very high. On the flip side, it is too early to comment on the cyber resilience of e-currencies. As far as emerging countries are concerned, the decision of creating digital currencies is contingent on evolution of high speed networks and electronic devices and their safety aspects. Governance and risk management and technical issues of the technology are major challenges. Some also hold the view that CBDCs will give rise to privacy concerns and private sector cryptocurrencies may do the job. On the other hand, China has cracked down on private cryptocurrency miners and traders but is embracing the technology for issuing central bank cryptocurrency citing payment efficiency. CBDCs issuance could have far-reaching consequences for commercial and central banking – divorcing payments

from private bank deposits and even putting an end to banks' ability to create money. By redefining the architecture of payment systems, CBDCs could thus challenge fractional reserve banking and reshape the conduct of monetary policy.

If households and firms were given access to CBDC accounts at the central bank, banks' dominant role as providers of payment services would be challenged. In effect, retail payments (and securities transactions) would no longer have to be mediated by banks, as the funds would be transferred directly from one party's CBDC account to another's. A disintermediated payment system could gradually replace the current centralised system and its associated credit and liquidity risks. The main benefit to CBDC account holders would be access to cheap and fast peer-to-peer transactions. Residents will be able to directly own central bank money in a blockchain system, bypassing commercial banks. Central banks will not just be bankers to banks but also bankers to citizens. In other words, direct access to central bank money as well as the central bank ledger can shake the business models of banks to their very foundation. This could also usher existential challenges for banks.

Views on CBDCs are more favourable in countries with low demand for physical currencies, with people preferring to use electronic modes of payment (i.e., liabilities of commercial banks rather than central bank), thus, depriving central banks of possible seigniorage. On the flip side, it is too early to comment on the cyber resilience of e-currencies. As far as developing countries are concerned, the decision of creating digital currencies is contingent upon evolution of high speed telecommunication networks, wider reach of information technology-enabled reliable, secure and cost-effective solutions to micro/small enterprises and the general public.

Nevertheless, given the disadvantages, and the mistrust with existing crypto-currencies, many central banks around the world have stepped up efforts towards developing digital versions of their fiat currency to leverage the benefits of the underlying blockchain technology. Early experiments have not

concluded that DLT based CBDC offers significant benefits from a payments perspective. However, a deeper research/analysis on CBDC is required before brushing aside the idea. It would also be beneficial to understand from the jurisdictions who have authorised/regulated activities of cryptocurrencies including crypto- exchanges, the learnings from such decisions, including the off-site surveillance mechanism instituted by these jurisdictions.

(iii) Impact on monetary policy and cross-border capital flows

While the impact of private crypto currencies on monetary policy would be too far-fetched at this point of time, implications of issuance of CBDC on the conduct of monetary policy and its transmission would depend on the design features of CBDC, in particular, (i) whether CBDC will be unremunerated like paper currency, or will it be remunerated like bank reserves as in many countries; (ii) whether it will be widely accessible just like physical currency, or will it be limited to wholesale customers, like banks, as in the case of reserves. Given the price volatility of Bitcoin as also other similar VCs, whether the rigid predetermined supply of VCs is desirable from monetary policy perspective. Given a constant supply of money, fluctuating aggregate demand will yield fluctuating prices. Under a fiat currency regime, the central bank aims to adjust the money supply in response to changes in demand for money in order to stabilize the price level. Since such a mechanism is absent in the current VC conventions, it is expected that VC units will exhibit far higher short-term price fluctuations than existing fiat currencies.

Transactions under VC system are unexplored zone for central banks. Users can conduct cross-border payment just like sending an email. Thus, an international transaction will decrease money supply in one country and increase in another country. As this transaction happens without the use of global central banks and intermediaries, the only record is in the block chain, but the block chain does not show whether the transaction crossed national borders (Kelly, 2014). Bitcoin was acknowledged to

facilitate currency flight on a large scale during the Greek debt crisis of 2015 as also there are reports of their increased usage in countries exposed to political/currency crises. As there was an attempt to prevent currency flight by restricting the exchange of euros for other currencies within Greece, utilising the loophole of Bitcoin not recognised as a currency, traders circumvented controls by buying them and swapping for US dollar. This lacuna could perhaps pose challenges for EMEs in managing capital account.

(iv) Regulatory challenges for the financial system

Building a common understanding on the nature of tokens is an important regulatory challenge. If there is no uniform approach across jurisdictions, the volumes might move to those locations/centres with lax or no regulations, exacerbating the financial risks associated with crypto-currencies. A common regulatory approach may lead to better enforceability. There are reports that VCs have been used to circumvent foreign exchange and capital controls. The relative ease of acquiring them on the internet makes them particularly attractive in regimes where the costs and national regulatory burden associated with traditional payment systems are high along with high smartphone usage. Authorities need to come up with guidelines for crypto exchanges to curb this phenomenon and report suspicious transactions. Financial Action Task Force (FATF) held that the most significant money laundering/terrorist financing risks are concentrated in points of intersection between VCs and the regulated financial system. National authorities would be required to implement preventive measures and report suspicious transactions. The absence of information on counterparties, global reach of crypto-currencies, lack of information-sharing across jurisdictions, etc., only compound the problems and amplify the propensity to hold/trade in the cryptocurrencies. Thus, effectiveness of any approach to mitigate these risks will, to a large extent, depend on the co-ordination across jurisdictions.

During the year 2017, the astronomical rise in cryptocurrency values inspired many cyber criminals

to shift to coin mining as an alternative revenue source. These rising cyber security threats raise concerns about customer protection. While it is difficult to regulate crypto currencies, it is easier to impose a ban on their buying and selling. The regulated financial intermediaries offering services to VC market participants are exposed to reputational risk. Some regulated entities may also be considering investment in pure VCs or in a portfolio of funds that invest in them. We cannot also rule out the possibility of the entities accepting VCs as collateral for lending. Therefore, it is important to ring-fence the regulated financial intermediaries from the risks including concerns around AML. In India, the Reserve Bank of India has instructed its regulated entities to end their relationship with clients dealing in cryptocurrencies.

Offering better protection to non-professional investors – The retail investors may not be able to make informed decisions while subscribing to initial coin offerings (ICOs) due to lack of disclosures in most of the ICOs and lack of clarity on legality. Guidelines for crypto exchanges should be evolved so as to strengthen customer protection. Reserve Bank of India (RBI) has issued public notices cautioning users, holders and traders of Virtual Currencies (VCs), including Bitcoins, regarding the potential economic, financial, operational, legal, customer protection and security related risks. Further, RBI has also clarified that it has not given any licence/authorisation to any entity/company to operate such schemes or deal with Bitcoin/VCS.

V. Conclusion

Given the nascent stage of development and application of blockchain technology to modernise core payment infrastructure, it remains to be seen how cost effective and efficient the systems using this technology are going to be; more so, given the concerns around energy consumption and slow process of transaction authentication. Price volatility and scalability issues frequently raise concerns about the suitability of VCs as efficient and effective payment instruments. Even countries

with high-speed telecommunication network and well performing e-currency payment and settlement have still a long way to go in establishing a safe, reliable and sound infrastructure for payments. This challenge is significantly higher for developing countries. Bitcoin and other private digital currencies could come under significant stress at times of adversity and their continued use for evading taxes, financing illicit activities, illegal trade, etc. could pose a risk to the stability of financial system, if their scale gathers critical mass. One can safely say that cryptocurrencies in their current form are unlikely to substitute fiat currency anytime soon.

While there are significant limitations of VCs in replacing physical currency, the block chain/DLT underlying their design can be used in areas such as international trade, trade finance, cross-border remittance transfers characterised by high transaction fee, and in plugging leakages in social benefit transfers in low income countries. More importantly, in developing countries like India, it can be used in a variety of economic applications such as creating digital land records, financial inclusion, and benefit transfers. However, significant challenges remain in terms of overcoming poor internet connectivity, higher cost of transactions, deficits in electricity supply and low levels of financial literacy.

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BANK QUEST THEMES FOR THE COMING ISSUES

The themes for next issues of "Bank Quest" are identified as:

1. Financial Inclusion & Financial Literacy: October - December, 2019
2. Alternative Channels of Investments - Sub -themes: Mutual Funds, Post-Office & Bank Deposits & others: January - March, 2020
3. Strategic Technology Trends in Banks - Sub - themes: Traditional lending to Digital flow based lending, Fintech landscape in India, Cyber Security, Big Data Analytics, Customer Experience: April - June, 2020
4. NBFCs, Systemic Risk and interconnectedness amongst Financial Institution s: July - September, 2020



Exchange Rate Volatility and its Macroeconomic Implications: Empirical evidence from India

 **Aswathy Rachel Varughese***

Abstract

Enhanced financial openness made exchange rate volatility sensitive to the ripple effects of global economic events. The linkage between exchange rate volatility and the domestic macroeconomic factors became strong with increased financial integration. This paper attempts to delve into the exchange rate volatility episodes in India pre and post financial crisis (2000-2018). It also empirically investigates the macroeconomic implications on exchange rate volatility using Johansen Co-integration and Vector Error Correction Model (VCEM). The study found that exchange rate volatility has a long-term relationship with all crucial macroeconomic variables like inflation, interest rate, exports and imports. The short run dynamics is clear with Error Correction terms, β (the speed of adjustment) which is faster in the empirical estimation, meaning it adjusts with the long run equilibrium at a faster pace.

1. Introduction

Financial integration across the globe took exchange rate and its movement to the centre stage. Exchange rate is an important financial variable that influences the behaviour of investors all over the world and the business conducted by traders, financial institutions, tourists etc. (Dua & Ranjan, 2010). Hence the exchange rate volatility or its movement has been deliberated at length and breadth in the light of its macroeconomic

implications and with regard to policy making. The stability of exchange rate and the way it influences various macroeconomic variables like growth, inflation, interest rates, capital flows etc. reiterates its policy implications (Buch, 2018). The direct impact of foreign exchange volatility on economic growth is vague in the literature as the former is a nominal variable that leaves no effect on long term economic growth in an economy (Ebaidalla, 2013). However, its association with inflation, interest rates, trade and capital flows are widely discussed. With enhanced foreign capital openness, any exchange rate regime may be faced with inflationary pressure on the back drop of 'Policy Trilemma' of Mundell and Fleming (1961). In a given global macroeconomic environment no nation can avoid facing the *impossible trinity*¹ (Mankiw, 2011). Hence the nature of exchange rate regime and its stability becomes crucial for domestic policy making. Against this backdrop, the present study attempts to investigate the exchange rate volatility in India in the pre and post financial crisis era and empirically test the macroeconomic implications in the short and long term.

Taking a cue from evolving global scenarios, India tested various exchange rate regimes. Starting from 1950s International Monetary Fund's (IMF) par value system, 1970s basket peg and by 1980s a market determined system. Since 1993 it has been a managed float, allowing market forces within a set

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¹It is impossible for a nation to have free capital flows, a fixed exchange rate and independent monetary policy simultaneously. A nation must choose either of two abandoning one option. This is the basic macroeconomic policy trilemma for open economies. It's known as Mundell's Impossible Trinity. In 1999 Robert Mundell was awarded Nobel Prize for his work in Open Economy Macro Economics.

band (Mohanty & Bhanumurthy, 2014). Even in this partial float mechanism, the country's exchange rate suffers from the ripple effects of global and especially the Emerging Market headwinds. The movements in the exchange rate influence the direction of several domestic macroeconomic variables. The present study attempts to delve into the macroeconomic implications of exchange rate volatility and tries to get empirical evidence in the context of recent global events during 2000-2018. The study also looks at the exchange rate volatility's implications for the country's banking system as a whole.

There were considerable macroeconomic repercussions from financial integration globally since opening up of world economies. The enhanced liberalization of capital movement led the world nations to trust with various concerns regarding managing the domestic economy. Demons like currency crisis that led to financial crisis, macroeconomic dilemmas started crept into the system of world economies. A slew of crisis events started with European Monetary System (1992), Mexico crisis (1994), South East Asian crisis (1997), Brazil and Russia (1998) and the near collapse of US based long term capital management fund. These were the culmination of external shocks, capital flights and currency crisis. Emerging Market Economies (EMEs) were the most vulnerable ones. The crisis and its spread made it all clear that some well-known policy trade-offs for open economies remain strong and currency management becomes crucial for any economy (Krugman & Obstfeld, 2015). According to Summers (2000) EMEs give a great deal of thrust on exchange rate stability because of their institutional mechanism which is not enough to conduct fully independent monetary policy while currency rates are highly fluctuating. As an EME, India too had passed several phases of exchange rate regimes, its management and policy makings.

The rest of the paper is organised as follows: section 2 deals with various exchange rate regimes in India, the country's exchange rate volatility episodes have been briefly analysed in section 3, macroeconomic implications of exchange rate volatility has been discussed in section 4, section 5 gives empirical specifications, section 6 discusses results of empirical estimation and finally section 7 concludes.

2. Exchange rate regimes in India

Post liberalization in 1990s, the county started mulling about relevant policy reforms in the exchange rate management front in line with global requirements. Consequently, the nation decided to do away with the fixed exchange rate regime. The high level committee on Balance of Payment chaired by C Rangarajan in 1993 recommended a market determined exchange rate regime. The recommendations of Sodhani Committee (1995), incorporated several policy reforms in the foreign exchange management as well as in the external sector front of the country. After independence, taking into account the global and domestic scenarios India passed through three major exchange rate regimes and they were Par Value² system (1947-1971), basket peg³ (1971-1991) and then shifted to the managed float.

Table 1: The chronology of India's exchange rate regimes and major events

Time Frame	Events in connection with exchange rate
1947-1971	Par Value system of exchange rate. Rupee's external par value was fixed in terms of gold with the pound sterling as the intervention currency.
1971	Breakdown of the Bretton-Woods system and floatation of major currencies. Rupee was linked to the pound sterling in December 1971.

²Under this exchange rate regime, the Rupee's external par value was fixed at 4.15 grains of fine gold.

³The currency is linked to a select basket of currencies to avoid weakness of one currency affecting the exchange rate.

1975	To ensure stability of the Rupee, and avoid the weaknesses associated with a single currency peg, the Rupee was pegged to a basket of currencies .
1978	RBI allowed the domestic banks to undertake intra-day trading in foreign exchange.
1978-1992	Banks began to start quoting two-way prices against the Rupee as well as in other currencies. As trading volumes increased, the 'Guidelines for Internal Control over Foreign Exchange Business' were framed in 1981. The foreign exchange market was still highly regulated with several restrictions on external transactions, entry barriers and transactions costs. Foreign exchange transactions were controlled through the Foreign Exchange Regulations Act (FERA) .
1990-91	Balance of Payment crisis
Jul-91	To stabilize the foreign exchange market, a two - step downward exchange rate adjustment was done (9% and 11%) . This was a decisive end to the pegged exchange rate regime.
Mar-92	To ease the transition to a market determined exchange rate system, the Liberalized Exchange Rate Management System (LERMS) was put in place, which used a dual exchange rate system. This was mostly a transitional system.
Mar-93	The dual rates converged, and the market determined exchange rate regime was introduced. All foreign exchange receipts could now be converted at market determined exchange rates.

Source: RBI⁴

3. India's Exchange Rate Volatility Episodes

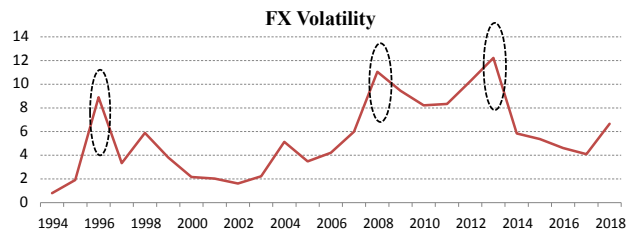
Post 1993, after adopting a manage float India's exchange rate volatility analysis revealed that Rupee has on an average depreciated against the green back. However, in comparison with the global peers

Rupee is less volatile (Dua & Ranjan, 2010). Only three major episodes of volatility could be traced during a period of 1993-2018. In 1996 on the back of global headwinds and domestic situations, especially adoption of several policy measures took Rupee for a ride. The large scale central bank intervention during this period was one of the reasons attributed for the high volatility. The period between 1996 and 2007 the movement of Rupee was not much volatile and its termed as the period of 'moderation' (Mohanty & Bhanumurthy, 2014). As the global financial crisis kicked off a volatile swing for the domestic currency. Again in 2013 the aftermath of global financial crisis paved way for taper tantrums by the developed world which led to another episode of considerably higher exchange rate volatility in the country. Here the foreign exchange volatility in the country is calculated by taking the rolling standard deviations standardized for number of days for each financial year during 1994-2018. The current study followed the formula adopted by (Serenis & Tsounis, 2014) and it's as follows:

$$Exv_{t+m} = \left(\frac{1}{m} \sum_{i=1}^m [(N_{t+i-1} - N_{t+i-2})^2] \right)^{1/2}$$

Where Exv_{t+m} is exchange rate volatility annualized for 252 trading days and N is the nominal exchange rate.

Figure: 1 Foreign Exchange volatility trends in India



Source: Author's calculation based on RBI's exchange rate data

⁴<https://rbi.org.in/scripts/publicationsview.aspx?id=12252#EXC>

4. Macroeconomic implications of foreign exchange volatility

The proponents of fixed and floating exchange rates have varied opinions about the exchange rate volatility and its direction. As per the supporters of fixed exchange rate, stability in exchange rate matters regarding the performance of export sector, instils confidence in foreign investors and a crucial factor for economic growth. In contrast with these arguments floating exchange rate supporters opined that flexibility in exchange rate will be easier for the adjustments in Balance of Payments according to the global macroeconomic headwinds (Ebaidalla, 2013). The direction of exchange leaves impact on the business cycle of the economy, international trade and capital flights which in turn will impact the variables like growth, inflation, interest rates and so on.

Given the nominal nature of the exchange rate volatility, the existing literature is divided on the kind of impact it leaves on the economic growth. They also argue that it depends on the kind of exchange rate regime is a crucial factor in determining its effect on growth. Gosh (1997) argued that exchange rate fluctuations leave significant impact on the real growth in a cross country analysis. However for the Asian countries, the pre - crisis era of 1997-98, the stability in foreign exchange rate supported the domestic fundamentals and hence the economic growth (McKinnon & Schnabl, 2004).

Inflation is another macro variable that shows sensitivity towards the fluctuations in the exchange rate. Exchange rate fluctuation is one important variable that affects the dynamics of inflation in economy especially among EMEs (Montiel, 1989). Empirical literature confirms the inflationary pressure of exchange rate movements.

The impact of exchange rate volatility on domestic interest rate gives an idea about the way it affects the

lending and deposit rates of the banks in the country. For instance, if the domestic currency is highly volatile and depreciating at a large extent and the when it is oversupplied in the foreign exchange market, the central bank will not be able to reduce the interest rate even though the domestic inflation is tamed. The monetary conditions of the EMEs restrict the central bank to exercise a monetary policy with sovereignty (Sheel, 2014).

Historically, it is evident that the way exchange fluctuations affected the volume of trade and worsen the Balance of Payments after the collapse of Breton Woods system (Ebaidalla, 2013). The volatility in the exchange will make exporters difficult to hedge their exposure and affect the trade volumes (Clark, 1973). Another bunch of economists argued that that trade and exchange have a positive significant relationship from the income and substitution point of view. As income effect offsets the substitution the association will be strong positive. However, the empirical literature lacks a consensus on this and thus provides scope for further research especially with respect to India.

5. Variables, Data and Model Specifications

The influence of exchange rate volatility on select macroeconomic variables in the India context during a period of 2000-2018 has been analysed in the present study. Foreign exchange rate volatility, Gross Domestic Product (GDP) at constant price (2011-12), Consumer Price Index (CPI), Interest Rate (repo), Total capital flows including Foreign Direct Investment (FDI) and Foreign Portfolio Investment (FPI) and Money supply (M3) are the macro economic variables taken into account here. All these secondary data have been taken from RBI's Handbook Statistics on Indian Economy for 2000-2018.

Given the time series nature of the data series, the study checked the Stationarity of the variables and confirmed that all variables in the considered from

follows an, $I(1)$ process. The study proceeded with conducting Johansen Co-integration to understand the association between the variables under study. It further made use of Vector Error Correction Model (VCEM) to find out whether there exists any short run relationship between the variables under consideration. Besides, the study conducted Wald test to know more about the short run dynamics between the variables.

In a bid to understand the impact of foreign exchange volatility on real GDP growth of the economy the following equation has been estimated in the log- log form.

$$rGDP_t = \alpha_0 + \alpha_1 fxv_t + \alpha_2 capflw_t + \epsilon_t$$

Where $rgdp_t$ represents the real economic growth at 2011-12 prices, fxv_t is the foreign exchange volatility measured through the rolling standard deviation and $capflw_t$ captures the foreign capital flows including FDI as well as FPI.

Next attempt is to find out the influence of exchange volatility on domestic inflation measured by CPI in the country. For finding out this association the log - log form of the equation is specified as follows.

$$cpi_t = \alpha_0 + \alpha_1 fxv_t + \alpha_2 int_t + \epsilon_t$$

Where cpi_t refers to the retail inflation measured by CPI of base year 2004-05 and int_t captures the interest rate (repo) fixes by the central bank of the country.

Further set of equations give insight on the influence of foreign exchange volatility on trade (export and import) of the country.

$$exp0_t = \alpha_0 + \alpha_1 fxv_t + \alpha_2 cpi_t + \epsilon_t$$

$$imp_t = \alpha_0 + \alpha_1 fxv_t + \alpha_2 rgdp_t + \epsilon_t$$

Where, $exp01$ refers to exports and imp_t imports of the country in USD million.

Here the impact of exchange rate on domestic interest rate of the economy is also analysed. The following equation is estimated for understanding this. The

interest rate is the repo rate fixes by the central banks.

$$int_t = \alpha_0 + \alpha_1 fxv_t + \alpha_2 cpi_t + \epsilon_t$$

6. Results of empirical estimation

6.1 Stationarity Checks

Stationarity check has been conducted for all the variables included in the model using Augmented Dickey-Fuller test statistic. All variables included in the models are found non-stationary at $I(0)$ with trend, intercept and without both, however at the first difference all variables found stationary at level. The unit root test rejects the null hypothesis that the first differenced variables have unit roots at level.

Table 2: Results of Unit root tests

Variables	P-values of variables at 1 st difference at level
dfxv	0.000***
drgdp	0.007***
dcapflw	0.003***
dcpi	0.000***
dint	0.000***
dexp01	0.005***
dimp	0.002***

Source: Author's calculation

6.2 Lag length criteria

After running an unrestricted VaR, Akaike Information Criteria (AIC) and Schwarz Information Criteria (SIC) have been investigated for optimum lag length selection.

Table 3: Summary results of AIC and SIC

Models	AIC	SIC
rGDP vs Fxv	77.63 (2)	80.28 (2)
CPI Vs Fxv	12.36 (2)	14.17 (2)
Exp01 Vs Fxv	32.30 (1)	33.32(1)
IMP Vs Fxv	54.90 (1)	55.68 (1)
Int Vs Fxv	96.25 (2)	97.85 (2)

Source: Author's calculation

6.3 Johansen Co-integration Test

Johansen Co-integration test has been conducted to know whether the variables in the model have an association or not. Trace test and Max Eigen - value test results at 5% level of significance have been taken into account for understanding the co integrating equations. From the first model, there exists an association between the variables real GDP, exchange rate volatility and capital flows in the country. The results show that there are two co-integrating equations in the model specified. The second model that investigated the relationship between inflation, exchange volatility and interest rate showed that there are two co-integrating equations. Export and import, FX volatility, inflation and real growth model showed there is only one co integrating equation, whereas the association with trade deficit portrayed two co-integrating equations. Relation with interest rate, FX volatility and inflation showed two co-integrating equations.

Table 4: Summary of results of Johansen Co-integration

Variables	Hypothesized No of CE(s)	P value of Trace Test	P value of Max Eigen-value
Real GDP, FX volatility & Capital flows	None *	0.0002	0.0020
	At most 1 *	0.0336	0.0365
	At most 2	0.2194	0.3564
CPI, FX volatility & interest rate	None *	0.0003	0.0016
	At most 1 *	0.0480	0.0801
	At most 2	0.1020	0.1020
exp01, FX volatility & CPI	None *	0.0074	0.0391
	At most 1	0.0694	0.1162
	At most 2	0.1016	0.1016

Variables	Hypothesized No of CE(s)	P value of Trace Test	P value of Max Eigen-value
imp, FX volatility & real GDP	None *	0.0004	0.0008
	At most 1	0.1324	0.1294
	At most 2	0.3135	0.3135
Interest rate, FX Volatility & CPI	None *	0.0003	0.0016
	At most 1 *	0.048	0.0801
	At most 2	0.102	0.102

Source: Author's computations

6.4 Vector Error Correction Model (VCEM)

VECM gives the error correction term or the speed of adjustment in the long run equilibrium. Model 1 shows that association between real GDP growth, FX volatility and total capital flows. The t- statistics reveals that there exists a long run association between real GDP, exchange volatility and capital flows. Exchange rate volatility is a strong factor influencing the real economic growth of the country along with capital flows (R^2 is 77%). Wald test with F-statistic (0.472) and Chi-square statistic (0.944) yielded the result that there is no short term relationship between exchange rate volatility and real GDP. However, at 10% level of significance there is a short term relationship between real GDP and capital flows in the country. The residual diagnostic tests Jarque-Bera (0.98), Breusch-Godfrey Serial Correlation LM Test with Chi-square statistic (0.89) and heteroskedasticity chi-square statistic (0.95) confirmed the robustness of the model specified. The speed of adjustment is faster in exchange rate volatility growth association.

The co-integrating equation for the models is as follows:

$$rGDP_t = 2.86 + 0.81fxv_t + 0.23capflw_t + \epsilon$$

(-3.86)* (4.72)*** (2.14)*

In Model 2, the t-statistic confirmed that there is a long run association between inflation, exchange rate volatility and interest rate (repo). 74% of the variation is caused by the independent variables in the model. Wald test with F-statistic (1.96) and Chi-square statistic (3.91) confirmed that there is no short run relationship with inflation and exchange rate volatility rather the relations is long run. The residual diagnostic tests Jarque-Bera (0.92), Breusch-Godfrey Serial Correlation LM Test with Chi-square statistic (0.88) and heteroskedasticity chi-square statistic (0.99) confirmed the robustness of the model specified above. Here also the exchange rate volatility has a stronger impact on domestic inflation in the long run and the speed of adjustment is faster.

The co-integrating equation for the models is as follows:

$$cpi_t = 0.30 + 1.10fxv_t + 0.56int_t + \epsilon$$

(2.64) ** (-3.94)*** (-1.51)*

Model 3 that investigated the relationship between export, FX volatility and inflation. The VECM yielded the result that there is a long term association between these variables. However, there is only 35% variation caused by exchange volatility and inflation on exports. The Wald tests confirmed that there is no short term relationship too with these variables. Depreciation of the domestic currency may make the imports dearer where as it may not make the export competitive as per the empirical evidence. The residual diagnostics tests show that model is free from serial auto correlation and heteroskedasticity with Jarque-Bera (0.60), test for normality, Bruesh-Godfrey Chi-square (0.40) for autocorrelation and heteroskedasticity Bruesh- Godfrey chi-square (0.63). The co-integrating equation for the models is as follows:

$$exp0_t = 0.02 + 3.17fxv_t - 0.26cpi_t + \epsilon_t$$

(-2.36)** (-3.97)** (1.98)*

Model 4 that took into account the impact of FX volatility and real GDP growth on import of the country also yielded similar VECM results stating that there is only long term relationship with these variables and no short term association. However, there is 53% variation caused by the independent variable on import sector of the country. It may be stated that domestic currency fluctuations affect import more than the export sector of the economy.

The co-integrating equation for the models is as follows:

$$imp_t = 4.82 + 0.56fxv_t + 2.81rgdp_t + \epsilon_t$$

(4.27) * (-3.19)*** (-1.08)

Model 5 considered the impact of exchange rate volatility on the interest rate of the economy. As per the t statistic of VECM, there exists a long term relationship between the variables interest rate, FX volatility and inflation. The Wald test statistic confirmed about the lack of short term association with these variables. The residual diagnostics confirmed the robustness of the model too by yielding Jarque-Bera (0.89) and Buresh- Godfrey (0.68).

The co-integrating equation for the models is as follows:

$$int_t = \alpha_0 + \alpha_1fxv_t + \alpha_2cpi_t + \epsilon$$

(-2.32) * (-3.98)*** (-1.99)*

Conclusion

In India exchange rate volatility has a long term relationship with all important macroeconomic variables. Though exchange rate is a nominal variable, a developing country like India has a long

term association with the real growth of the economy through various indirect channels. Exchange rate volatility has an impact on the domestic inflation and this association is strong compared to all other variables. The high exchange rate volatility episodes in India stand as a testimony for this fact. The fluctuations in the exchange rate can induce retail inflationary pressure on the domestic economy. The exchange rate volatility affects the trade volume of the country. The foreign exchange stability has lot to do with imports rather than exports. An event of depreciating domestic currency will influence the import more than exports. This means the depreciation makes the country's import dearer to a greater extent than making the exports competitive. Finally, the interest rate prevailing in the domestic economy gets influenced by the exchange rate volatility. Depreciating domestic currency may hamper the central bank to reduce the interest rate even if domestic inflation is tamed and under control. By this way it affects the lending and deposit rates of the banks in the country too.

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Appendix:

Table 1A: Result of the estimation of Model 1

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	-0.252134	0.088108	-2.861653	0.0243
C(2)	-0.345501	0.226557	-1.525006	0.1711
C(3)	-0.032611	0.206648	-0.157809	0.8791
C(4)	6091.591	10736.38	0.567378	0.5882
C(5)	-5290.887	9350.145	-0.565861	0.5892
C(6)	7.336560	2.619381	2.800876	0.0265
C(7)	3.379630	1.319633	2.561037	0.0375
C(8)	63313.09	23253.38	2.722748	0.0296
R-squared	0.773031	Mean dependent var		43670.49
Adjusted R-squared	0.546062	S.D. dependent var		101570.8
S.E. of regression	68433.25	Akaike info criterion		25.40963
Sum squared resid	3.28E+10	Schwarz criterion		25.78726
Log likelihood	-182.5722	Hannan-Quinn criter.		25.40561
F-statistic	3.405890	Durbin-Watson stat		1.887970
Prob(F-statistic)	0.064131			

Source: Author's computation

Table 2a: Result of the estimation of Model 2

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	0.309793	0.117207	2.643118	0.0333
C(2)	-1.101719	0.279603	-3.940301	0.0056
C(3)	-0.560711	0.369043	-1.519366	0.1725
C(4)	-1.086059	0.612533	-1.773061	0.1195
C(5)	-0.632435	0.327546	-1.930827	0.0948
C(6)	-0.312764	0.583189	-0.536300	0.6084
C(7)	-0.911560	0.599280	-1.521092	0.1720
C(8)	0.439517	0.643524	0.682985	0.5166
R-squared	0.741559	Mean dependent var		0.186994
Adjusted R-squared	0.483119	S.D. dependent var		3.408096
S.E. of regression	2.450232	Akaike info criterion		4.934769
Sum squared resid	42.02547	Schwarz criterion		5.312396
Log likelihood	-29.01077	Hannan-Quinn criter.		4.930747
F-statistic	2.869359	Durbin-Watson stat		1.794282

Source: Author's computation

Table 3a: Result of estimation of Model 3

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	0.057577	0.176875	0.325526	0.7509
C(2)	-0.295915	0.266214	-1.111567	0.2900
C(3)	2008.377	4202.960	0.477848	0.6421
C(4)	6122.955	3019.422	2.027857	0.0675
C(5)	697.8726	8196.928	0.085138	0.9337
R-squared	0.352085	Mean dependent var		1766.087
Adjusted R-squared	0.116480	S.D. dependent var		34802.22
S.E. of regression	32712.61	Akaike info criterion		23.87922
Sum squared resid	1.18E+10	Schwarz criterion		24.12065
Log likelihood	-186.0337	Hannan-Quinn criter.		23.89158
F-statistic	1.494386	Durbin-Watson stat		2.166717

Source: Author's computation

Table 4a: Result of estimation of Model 4

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	-0.179279	0.432259	-0.414750	0.6907
C(2)	-0.246331	0.518390	-0.475185	0.6491
C(3)	-0.610938	0.444392	-1.374774	0.2116
C(4)	1109.268	6302.934	0.175992	0.8653
C(5)	4214.340	5980.187	0.704717	0.5038
C(6)	0.221485	0.195538	1.132699	0.2946
C(7)	0.107780	0.234697	0.459230	0.6600
C(8)	-11689.29	19480.91	-0.600038	0.5674
R-squared	0.532856	Mean dependent var		4748.164
Adjusted R-squared	0.065711	S.D. dependent var		59050.07
S.E. of regression	57076.97	Akaike info criterion		25.04672
Sum squared resid	2.28E+10	Schwarz criterion		25.42434
Log likelihood	-179.8504	Hannan-Quinn criter.		25.04269
F-statistic	1.140666	Durbin-Watson stat		1.469786

Source: Author's computation

Table 5a: Results of the estimation of Model 5

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	-0.039753	0.019248	-2.065323	0.0778
C(2)	-0.343988	0.343052	-1.002727	0.3494
C(3)	0.135392	0.352518	0.384071	0.7123
C(4)	0.275869	0.360314	0.765634	0.4689
C(5)	0.149726	0.192674	0.777093	0.4626
C(6)	0.527668	0.164472	3.208248	0.0149
C(7)	0.135351	0.217084	0.623497	0.5527
C(8)	-0.068069	0.378544	-0.179817	0.8624
R-squared	0.768475	Mean dependent var		0.016667
Adjusted R-squared	0.536950	S.D. dependent var		2.118091
S.E. of regression	1.441314	Akaike info criterion		3.873515
Sum squared resid	14.54171	Schwarz criterion		4.251141
Log likelihood	-21.05136	Hannan-Quinn criter.		3.869492
F-statistic	3.319185	Durbin-Watson stat		2.054275

Source: Author's computation

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 **Bibekananda Panda***

Bumpy Road for Payments Banks: Regulatory Compliance and Competition Concerns Over Breakeven



 **Dr. Pradeep Kumar Pattnaik****

1 Introduction:

The fundamental premise of differentiated banking licences was to unleash financial innovation and inclusion to mass unbanked in India. Being the second most populated country, a large number of people even today are not covered under the formal financial channel. As per the Census 2011, out of 247 million households in the country, only 145 million (58.7 per cent) have access to banking services. Even the ratio is worse in rural India (54.4 per cent) compared to urban India (67.8 per cent). Latest World Bank Global Findex 2017 database has also revealed that out of 1.7 billion unbanked adults globally, India is the home to 190 million unbanked adults.

Based on the recommendations of the Committee on Comprehensive Financial Services for Small Businesses and Low Income Households (2013)¹ headed by Nachiket Mor, the RBI issued “in-principle” licenses² to 11 Payments Banks (henceforth PBs) in August 2015 with an endeavour to accelerate financial inclusion in the country, particularly by offering financial services in unbanked and under-banked regions of the country. It is economically unviable to provide banking services in the remote hinterland of hilly and tribal regions of the country as operation costs of running a traditional bank branch in those areas are very high which is the main reason for shying away of foreign and new private banks to operate in rural areas. Further in penetrating financial

inclusion in the country by the use of technology, differentiated banking licences was the solution.

Today even after three years of issuance of “in-principle” licence only seven of them have started operation. Given tough operating environment and regulatory guidelines, half of them have already come under the regulatory scrutiny in first or second year of their operation. Operating on a thin margin and tight regulatory environment, the PBs are left with financial loss in the initial year. The drying interest income component and sluggish economic recovery has been compelling the existing commercial banks to explore the remittance and payments business more intensively, which is again getting support by the digital payments technology, further threatening the PBs business viability.

In such a scenario, it is very much important to revisit the performance and prospects of PBs business model and their viability at current economic environment. Given the financial and performance statistics of these PBs which is hardly for one to two years, the study is an attempt to assess the present business prospects and viability of these new generation banks. Though adequate information on financial details and other ratios of most of these banks are not available, the study has used the overall performance statistics of PBs published first time by the RBI in its report on trend and progress of banking in India 2017-18.

In addition to the current section, the rest of the

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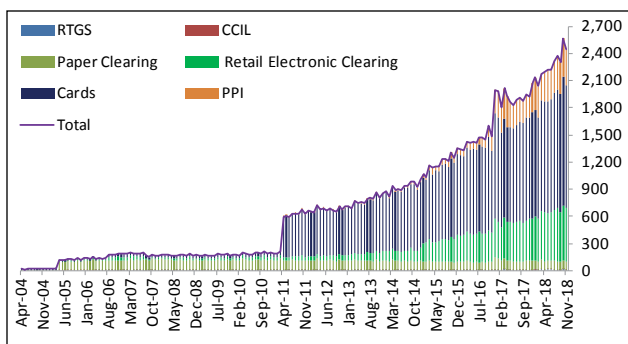
¹Committee on Comprehensive Financial Services for Small Businesses and Low Income Households (2013), Reserve Bank of India, <https://rbidocs.rbi.org.in/rdocs/PublicationReport/Pdfs/CFS070114RFL.pdf/>

²https://www.rbi.org.in/scripts/bs_pressreleasedisplay.aspx?prid=34754

paper is organized as follows. Section 2 discusses the evolution of digital payments system as well as PBs in India. The scope and performance of PBs in India is elaborated in Section 3. Section 4 discusses the key challenges or hurdles for the PBs to operate in the Indian banking industry. Some of the survival techniques for PBs are suggested in section 5. Section 6 concludes the study.

2. Evolution of Digital Payments System in India

Chart 1: Electronic Transactions in India: Volume (in Millions)



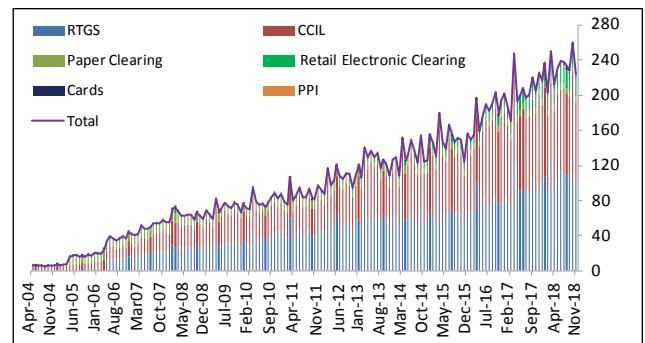
Source: Reserve Bank of India

The evolution of the payment system in India is since the early 1980s. Subsequently in 1988, the RBI adopted computerised settlement facilities at all its clearing houses. This was followed by the installation of core banking software in 2000 and the introduction of internet banking in 2001. The passing of the Payment and Settlement Systems Act in the Indian Parliament in 2007 was one of the major milestones in the growth of the payments system in India. Since the inception of this Act, the government has been striving towards a cashless economy via a growth of digital payments. Introduction of Real-Time Gross Settlement (RTGS) in 2004, the National Electronic Funds Transfer (NEFT) in 2005, establishment of the National Payments Corporation of India (NPCI) in 2008, introduction of Immediate Payment Service (IMPS) in 2010, and Unified Payments Interface (UPI) in 2016 have all eased the journey of the Indian

banking and economy towards a digitalisation.

As per the Boston Consulting Group and Google report (2016)³, the digital payments industry in India is projected to reach USD 500 billion by 2020, contributing 15 per cent to India's GDP. The demonetization decision and the unrelenting push towards digital channels by the Govt. have helped to boost the usage of digital channels intensively in the country in last couple of year⁴

Chart 2: Electronic Transactions in India: Value (in ₹Trillion)



Source: Reserve Bank of India

Latest data on payments system Indicators by RBI till November 2018 shows that the total volume of digital transactions have reached 2.5 billion compared to 1.6 billion in October 2016. The overall value of the transactions have also increased significantly to record ₹224.3 trillion in November 2018 from a level of ₹179.1 trillion in October 2016. This statistics clearly shows the wide acceptance of digital channels among Indian population.

Over the past few years, the payments landscape in India has shown some major shifts with digital payments witnessing an exponential growth. The massive growth of digital payment methods should consequently lead to a decrease in the use of cash. In spite of all this, the currency in circulation as of January 11, 2019 has reached over ₹20.5 trillion, more than 2.3 times from a low of about ₹8.9 trillion during post-demonetization period. This indicates that even though there is greater appetite for digital

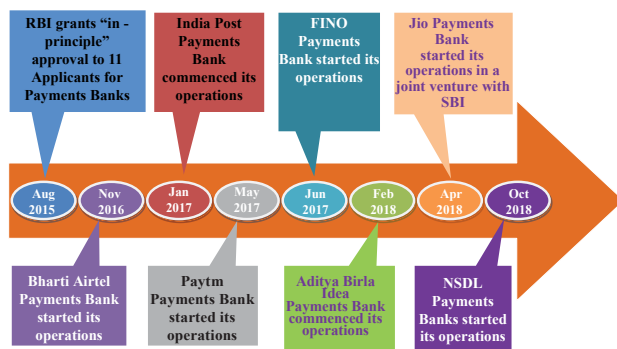
³Boston Consultancy Group & Google (2016), Digital Payments:2020; The Making of a \$500 Billion ecosystem in India;http://image-src.bcg.com/BCG_COM/BCG-Google%20Digital%20Payments%202020-July%202016_tcm21-39245.pdf

payments systems, the Indian economy continues to be heavily reliant on cash.

2.1 Evolution of Payments Banks in India

On the recommendations of the Nachiket Mor Committee in 2013, out of 41 applicants RBI issued “in-principle” licenses in August 2015 to 11 applicants to undertake banking business under Section 22(1) of the Banking Regulation Act, 1949 and seven of them have started their operation. Further penetration of financial inclusion in the country with the use of mobile technology was one of the major objectives for inviting differentiated banking in the country. The evolution time frame of the PB concept followed by in-principle as well as final licensing and operation of the seven licensed entities are presented in the below chart.

Chart 3: Evolution of Payments Banks in India

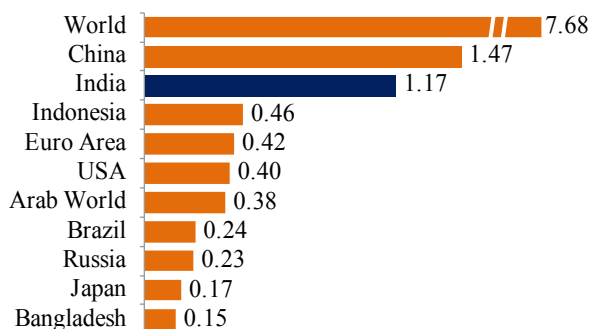


Source: Reserve Bank of India Press Release

The new PBs have been built on the model of accelerating the penetration of financial services among the low income customer segments by leveraging technology and building a large geographical footprint. These banks adopt a low-cost operational model via technology to provide connected services at all access points. Earlier studies⁴ argue that mobiles offer the cheapest mode of banking as a mobile banking transaction costs about 2 percent of the bank branching cost, 10 percent of ATM-based transaction and 50 per cent of the Internet banking cost. Banks that succeed in

digital banking can expect to see an increase in low-cost float funds. As per the latest World Bank data, India currently ranks second in the world with over 1.12 billion mobile subscriptions. This opens up huge potentials for the business of these PBs.

Chart 4: Mobile Cellular Subscriptions (in Billions): 2017



Source: World Bank, WDI Indicators

3. Performance of Payments Banks in India

PBs charge customers fee for making a transaction and get a fair amount of revenue from the payment merchants for facilitating remittances and bill payments. Interest arbitrage is another way in which they make money. RBI guidelines restrict PBs to lend where as they are allowed to provide payments, domestic remittance services and demand deposit products. Hence as a bank, the main source of income is not the interest income, rather it is the non-interest commissions and fees that dominates PBs balance sheet. The target customers of these new PBs are migrant labourers, low-income households, small business entities which help in providing remittance services and channelize the micro savings component of the rural lower strata. The PBs offer savings accounts and remittance services with a low transaction cost. The success of these PBs would largely depend on low-cost technology and high volume of transactions. Only economies of scale would make the charges reasonable and yet, profits can be made. The huge initial funding requirements on establishment, recruitment and other infrastructures

⁴https://www.rbi.org.in/scripts/BS_SpeechesView.aspx?id=726

have swelled the expenditures PBs balance sheets. Progresses of some of the PBs till date are presented in the below section.

Airtel Payments Bank: Airtel Payments Bank, the subsidiary of Bharti Airtel, is the first company in India to receive a PBs license from the RBI and it became the first live PB in the country in November 2016. Airtel is India's second largest and World's third largest telecom operator by subscriber base. Bharti Airtel owns 80.10 per cent of the Airtel Payments Bank while Kotak Mahindra Bank holds the remaining 19.90 per cent. The bank launched UPI enabled digital payments allowing secure digital payments to both online and offline merchants and instant money transfers to any bank account in India through smart phones in second quarter of 2017-18. It operates a network of more than 250,000 banking points (Airtel retail stores) across 29 States.

Airtel Payments Bank's revenue for FY18 was at ₹1,600 million, 68.6 percent increase in growth over previous fiscal. The expenditure of the Bank increased to ₹4,330 million in 2017-18 compared to ₹3,390 million in 2016-17, an increase of 27.7 per cent. Increased spending has widened the loss to ₹2,720 million in 2017-18, 11.6 percent higher than the net loss of ₹2,440 million in 2016-17. However in terms of deposit growth, the bank has been doing significant progress as deposits have grown by 76 per cent to reach at ₹2,900 million in 2017-18 from ₹680 million in 2016-17. Though the bank was offering very high interest rate on deposits in the initial phases of launching, in 2018 it has slashed the savings deposit rate twice by 325 bps (slashed 175 bps in February 2018 and 150 bps in September 2018) to 4.0 percent. This reduction in interest rate could be a way of keeping rates competitive. Though the initial phase of launching was smooth for the Bank, regulatory issues in connection to KYC authentication in the subsequent periods has disrupted in acquiring new customers for a considerable period. The initial cheer of boarding the existing customers of the

parent telecom operator was washed away and restrictions on curb of e-KYC is going to cost more to the bank to acquire new customers in the coming days. However, with a change in management and enhanced preparedness, the Bank may get back on track towards the goal of driving financial inclusion in the country.

Paytm Payments Bank: Prior to acquiring the license to operate as a PB, Paytm was operating as an e-wallet in India. Paytm Payments Bank, which was incorporated in August 2016, formally began its operations in May 2017. An overview of the financial analysis of the Paytm Payments Bank shows that, the bank reported a loss of ₹207 million for the fiscal ending March 2018 from its earlier loss of ₹307 million between August 2016 and March 2017. The total income of the bank, which was ₹7,291 million in financial year ended March 31, 2018 compared to ₹25 million in August 22, 2016 - March 31, 2017. Total expenses for the fiscal stood at ₹ 7,400 million. Most of the income of the bank (nearly ₹6,500 million) is earned as commissions, exchanges and brokerage, and on wallet utilisation. The bank has managed to accumulate a total deposit in savings account to the tune of ₹107 million. However, including the Wallet balances, the company shows a net deposit of ₹1,440 million. Even the Paytm Payments Bank has also under the regulatory restrictions and was barred to stop adding new customers post a regulatory audit in June 2018.

India Post Payments Bank: IPPB got incorporated as a Public Limited Company with 100 percent GOI equity under Department of Posts on 17th August 2016. Two branches were launched on 30th January, 2017 at Ranchi in Jharkhand and Raipur in Chhattisgarh in collaboration with Punjab National Bank. The Bank has commenced operations as a PB with effect from January 30, 2017.

As the parent entity India Post is having rich network of more than 1.55 lakh post offices, out of which

1.29 lakh offices are in rural area, IPPB is even better placed than other competitors to promote rural banking. The IT modernization project by India Post aims at transforming the department into a technology enabled, self-reliant market leader. It has digitized all the 1,54,965 post offices including 1,29,380 Gramin Dak Sewak Post Offices. Nearly 51,361 branch post offices have been covered by the DARPAN (Digital Advancement of Rural Post Office for a New India) project with Core Banking Solution. The project has been able to provide various financial transactions with the use of biometric identification and Micro ATM in Rural Branch Post Offices.

To promote financial inclusion in the country, the bank is thrusting upon the following channels; a) Counter Operations, b) ATMs / Micro ATMs, c) Doorstep, Mobile & Internet Banking, Aadhar Based Payments, d) Pre-paid instruments such as mobile wallets, POS, MPOS etc. and e) USSD / UPI etc. The bank is targeting on serving social sector beneficiaries, migrant labourers, un-organised sector employees, Micro Small and Medium Enterprises (MSMEs), Panchayats, low income households, in rural areas and the unbanked and under-banked segments in both the rural and urban areas⁵.

Fino Payments Bank Limited: Fino Payments Bank was incorporated on 4th April, 2017 partnered with Bharat Petroleum Corporation Ltd. (BPCL) and ICICI Bank Ltd. and have gone live with 410 branches across 14 States with 25,000 banking points. The bank aims to tap BPCL and ICICI Bank's facilities for expanding its banking reach. For some irregularities, the RBI had earlier in 2018 imposed certain restrictions on FINO Payments Bank. The Bank has a customer base of 1 million and is planning to increase this figure to 3 million by March 2019. Total revenue from the operation of Fino Payments Bank Limited during the year FY18 was ₹2,302 million and net loss was ₹673 million. The parent company Fino Paytech Limited is one of the leaders in providing technology solutions for institutions like banks, governments and insurance

companies in India. Its core strength lies in robust in-house technology, versatility of operations, scale of the channel, and customer know-how.

3.1 Consolidated Performance of Payments Banks in India

Table 1: Consolidated Balance Sheet of Payments Banks

(Amount in ₹Millions)	2016-17	2017-18
Total Capital and Reserves	7,936	18,479
Deposits	685	4,382
Other Liabilities and Provisions	3,318	26,055
Total Liabilities/Assets	11,939	48,916
Cash and Balances with RBI	191	3,583
Balances with Banks and Money Market	7,629	12,426
Investments	3,481	24,487
Fixed Assets	102	2,357
Other Assets	535	6,063

Source: Report on Trend and Progress of Banking in India 2017-18; Data for end-March 2017 and end-March 2018 pertain to two and five PBs, respectively. Hence, the data for these two years are not comparable.

Table 2: Financial Performance of Payments Banks

(Amount in ₹Millions)	2016-17	2017-18
A Income (i + ii)		
i. Interest Income	314	1,756
ii. Other Income	1,086	10,036
B Expenditure		
i. Interest Expended	7	245
ii. Operating Expenses	3,800	16,768
iii. Provisions and Contingencies	15	-56
of which, Risk Provisions	4	-66
Tax Provisions	11	10
C Net interest income (A-B)	307	1,511
D Profit		
i. Operating Profit (EBPT)	-2,407	-5,221
ii. Net Profit/Loss	-2,422	-5,165

Source: Report on Trend and Progress of Banking in India 2017-18; Note: Data for 2016-17 and 2017-18 pertain to two and five PBs, respectively. Hence, the data for these two years are not comparable

⁵https://www.indiapost.gov.in/VAS/DOP_PDFFiles/Post_AR_English_2017-18.pdf

Today, though all the seven PBs are operational, as on March 2018, only five were functional and the remaining two PBs became operational in H2 2018. Given only the statistics of a year or two, it is premature to comment on the performance of the PBs. However, RBI in its latest report on trends and progress of Banking in India 2017-18, has come out with few statistics on PBs. The subsequent paragraphs of the current section will use those data to present certain facts about PBs operation and performance.

The consolidated balance sheet of PBs have grown from ₹11,939 million in FY17 to ₹48,916 million in FY18. Unlike the schedule commercial banks, PBs balance sheet is mainly funded by capital and reserves. In FY17 the capital and reserves were 66 percent of total assets which came down to 37 percent in FY18. The fall in the ratio is driven by rise in deposits and provisions.

Table 3: Select Financial Ratios of Payments Banks

Item	FY17	FY18
Return on Assets (ROA)	-25.2	-10.6
Return on Equity (ROE)	-36.4	-22.4
Investments to Total Assets	29.2	50.1
Net Interest Margin (NIM)	2.8	4.5
Efficiency (Cost-Income ratio)	272.7	142.2
Operating Profit to Working Funds	-25.1	-10.7
Profit Margin	-172.9	-43.8

Source: Report on Trend and Progress of Banking in India FY18; Note: Data for end-March 2017 and end-March 2018 pertain to two and five PBs, respectively. Hence, the data for these two years are not comparable

In FY18, other liabilities including unspent balances in PPIs and provisions of the five PBs in operation accounted for more than half of their balance sheets. The share of deposits, though still low, have increased from ₹685 million (5.7 percent of total liabilities) in FY17 to ₹4,382 million (9.0 percent of total liabilities) during the FY18. As PBs are not allowed to lend, they are suppose to maintain a minimum investment to the extent of not less than 75 percent of demand deposit

balances in Government securities for maintenance of the SLR. As they are also required to maintain not more than 25 per cent of their deposits in demand and time deposits with other SCBs, their interest income is capped. During FY18, the share of investments in assets has increased from 29.2 percent to 50.1 percent.

Table 4: Remittances Business of Payments Banks: 2017-18

Item	Inward Remittances		Outward Remittances	
	Number (millions)	Amount (₹millions)	Number (millions)	Amount (₹millions)
NEFT	1	9,645	2	90,613
% Share	0.1	3.2	0.2	18.2
RTGS	-	20,098	-	31,737
% Share	-	6.7	-	6.4
IMPS	6	9,622	29	77,032
% Share	0.4	3.2	3.6	15.5
UPI	200	16,484	213	23,432
% Share	13.9	5.5	26.4	4.7
E-Wallets	1,232	2,43,368	559	2,65,479
% Share	85.6	81.0	69.3	53.4
Others	0.4	1,134	4	9,223
% Share	-	0.4	0.5	1.9
Total	1,439	3,00,352	807	4,97,516
% Share	100	100	100	100

Source: Report on Trend and Progress of Banking in India 2017-18; Note: Data for end-March 2017 and end-March 2018 pertain to two and five PBs, respectively. Hence, the data for these two years are not comparable

In terms of financial performance, the PBs have registered net losses during FY17 and FY18. The losses of PBs are attributed to high operating expenses as large capital expenditures incurred in the setting up of initial infrastructure. Even operating profit of PBs remained negative, although net interest income improved. As per RBI's reporting, even during the first half of 2018-19, the PBs have continued to incur negative operating profit. PBs may take some more time for reaching a break even as they reach economy of scale with large customer base by offering their unique banking products.

However, the performance of PBs has shown signs of improvement over the year. The NIM has improved from 2.8 percent in 2016-17 to 4.5 percent in 2018-19 and the cost to income ratio that measures the efficiency of the system has come down from 272.7 per cent in 2016-17 to 142.2 percent in 2017-18. Though ROA and ROE have been in negative territory, but the magnitude of negative numbers have come down significantly. The initial expenditure incurred during the establishment phase of operations has impacted the ROA and ROE for PBs.

In terms of business operations e-wallets has occupied the largest share in the total remittance business of PBs during 2017-18. More than 81 per cent of inward and 53.4 percent of outward remittances in terms of value were made through e-wallets.

4.0 Challenges faced by the PBs to Operate in Indian Banking

The newly licensed PBs have entered a mature and troubled sector though growing in nature. Hence they have to withstand tremendous pressure of competition. The diffusion of innovations theory of Everett Rogers (1983)⁶ argues that the diffusion of innovations lead to deepen the market share until it reaches a saturation level. As per the theory the success of PBs might be short lived as other competitors mainly the Commercial banks are aggressively following the trend and the technology is more or less going to be common to all. The aggressive expansion of existing commercial banks to the remittance and payment business is limiting the growth of the PBs. Some of the major challenges the new players experiencing are as follows

Competitive marketplace: Even though the PBs are expected to tap unbanked rural areas, this may not happen immediately. As and when it does happen, new customers may provide volumes but not profitability and the PBs will have to look at metropolitan and urban areas to increase their customer base as well as to maintain operational profitability. A payments

only offering is an incomplete proposition and relies highly on low ticket account balances for profitability.

Regulatory requirements: The mandatory requirement of CRR and SLR is applicable to the PBs, though in a separate quantum. Of every ₹100 of deposits collected, PBs will have to invest at least ₹75 in approved G-secs and are only left with the option of investing the rest ₹25 in any other high yield asset. Given the current G-secs yield at 7.5 percent, this would limit the PBs' ability to earn margins to meet the expenses. Even though it was believed that the licensed entities are already catering some type of financial services in the market and can easily transform their existing customer base to PBs, but the withdrawal of e-KYC norms and other tight regulatory norms has recently been very hard decision for the PBs.

Regulatory reporting and compliance automation: The regulatory reporting for a bank is very different than that of other financial entities. Apart from setting up a regulatory reporting process, PBs will also have to automate regulatory reports as per RBI guidelines for which they might have to invest a considerable capital in the process. The non-compliance may cost significantly to these new PBs. The recent violation of rules on using Aadhar for its e-KYC verification process has led to the imposition of fine and suspension of the e-KYC licence of Airtel Payments Bank. Similarly, in 2018, RBI has also taken strict action against Paytm and Fino Payments Bank and put a ban for a certain period wherein they could not onboard new consumer. The PBs were also financially penalised. This has increased operational costs and customer acquisition has become even more difficult for PBs.

Customer loyalty: Banking is always based on trust. Even today not all customers are dissatisfied with their existing banks, and not all dissatisfied customers are likely to switch banks. As some of the services provided by PBs overlap with existing banking services, PBs might struggle to snatch customers from existing players.

⁶Rogers, Everett M. (1983). Diffusion of innovations (3rd ed.). New York: Free Press of Glencoe.

IT infrastructure: A massive investment is required in enhancing the IT infrastructure base of PBs. Tasks like core banking implementation and multi-channel banking are likely to pose major challenges for PBs.

Human resources: The new banks need employees who are trained to work in a banking set-up. Apart from technical skills, staff will need to be proficient in soft skills as well, since banking today is also about relationship management. Accordingly, banks will need to spend time and funds on training and recruitment.

5.0 Possible Alternate Revenue Models for Payments Banks

PBs need to work on alternate unorthodox revenue streams including cross-selling of financial products, channelizing micro savings, marketing of mutual fund & insurance units, data monetisation, forming credit access platforms and creating alternate merchant payment models etc. to get around the constraint of not being able to lend.

Facilitate micro savings: A major part of households in low-income groups in remote rural areas have the tendency to make small and infrequent savings due to low levels of financial literacy and lack of access to organized financial services. To bring savings from outside banking system into PBs, these new entities to thrust on micro savings such as goal based savings plans and must reduce the minimum denomination for saving. PBs would focus on low-risk savings and align it to the savings behaviour of the various customer segments.

'YueBao', the Chinese third-party mobile and online payment platform has attracted more than 100 billion yuan of deposits from over 29 million customers in less than six months after its launch. It has become an attractive alternative to banks, offering higher annualized returns. It has extremely simplified investments into the money market and has also reduced the minimum investment denominations, thereby making it relevant to all customer segments. It is now a threat to traditional banks in China.

Facilitating large-scale access to credit: As PBs are not allowed to lend, they can act as a platform for an alternate mode of credit assessment. Payments banks could analyze and profile customers on the basis of the stability of transactions and outflows to arrive at an assessment of risk. In this way these banks could enable lenders to identify financially excluded but qualified leads in a targeted manner with significantly lower costs of acquisition.

'M-Shwari', the Kenyan successful digital banking service provider through a strategic partnership between a commercial bank and a telecom operator has acquired a large number of customers in the initial months of its operation. M-Shwari's unbanked customer segment lacked a credit score from any formal financial institution. The innovative approach to arrive at credit assessment and eligibility check for issuing a quick unsecured micro loan using multiple parameters such as balance in M-Shwari deposit account, M-PESA payment transactions, and voice and data usage on the telecom's network. The credit appraisal is carried out instantaneously and the eligible amount is made available on the customers' mobile phone within seconds.

Merchant acceptance: As ubiquitous merchant acceptance infrastructure is essential for achieving the long-term objective of a cashless society in India, a merchant-acceptance model that would incentivize customers and merchants to accept cashless payments and enable PBs to increase bank balances might work as an effective achievement strategy.

'Telesom ZAAD' in Somaliland has created an ecosystem of services and merchants where digital payments are accepted and all customer transactions are free. It has significantly changed the way people in Somaliland access banking and payments. Early alliances with merchants, government bodies and other entities with a vision to have a ubiquitous payment and remittance solution is the success of the Telesom ZAAD.

Marketing of additional financial services: PBs with additional effort would be able to cross-sell financial products such as insurance products, mutual fund investments etc. to their existing user base through their business correspondent network and digital channels to generate additional revenue streams.

'Bought By Many', a UK-based insurance start-up brings together customers with specific insurance needs (e.g., age, illness, residence location and profession) to represent to insurers and promote the creation and distribution of specialized insurance products. It matches customers who do not fit commoditized insurance policies to insurers who are willing to customize their offerings for such customer segments. PBs need to adopt a similar model by partnering with insurance companies for developing tailor-made and add-on insurance products specific to the requirements of various customer groups.

Business with Data: Payments Banks will generate a high volume of consumer transactions led data, which will include transactions such as mobile recharges, bill payments, e-commerce spends and offline merchant transactions.

'Meniga' offers a digital banking solution that aggregates, enriches and analyses transaction data from multiple sources to provide a truly personalized digital banking experience.

Conclusions

The opportunities and possibilities surrounding the PBs are numerous given nearly 40 per cent of households are unbanked in the country. Being the home to 190 million unbanked adults, the role of PBs cannot be ignored in linking the mass unbanked to the mainstream. Over the past few years, the payments landscape in India has shown some major shifts with digital payments witnessing an exponential growth supported by economic growth as well as government support. The new PBs have been built on the model of accelerating the penetration of financial services among the low income customer segments by leveraging technology and building a large

geographical footprint. As mobiles offer the cheapest mode of banking, being the second highest mobile subscriber base (1.194 billion by November 2018⁷), PBs business model that is based on technology has the huge potential to penetrate the financial market through mobile technology. Growing internet and mobile penetration in India is definitely an added advantage to PBs.

While there is huge potential for PBs, they also face several challenges. A payments-only offering is an, incomplete proposition and relies highly on low ticket account balances for profitability. Making a PB viable requires a fine balance between cost of acquisition of granular liabilities, offering competitive pricing on transaction charges and ability to quickly reach critical mass. Even though it was believed that the licensed entities are already catering some type of financial services in the market and can easily transform their existing customer base to PBs, the withdrawal of e-KYC norms and recent imposition of tight regulatory norms have been very harsh on PBs. The aggressive expansion of existing commercial banks to the remittance and payment business is again limiting the growth of the PBs. In the first year of operation, RBI has already penalised three major players for irregularities. This is very unfortunate for the PBs industry as a whole. Restrictions on e-KYC facilities are expected to increase the operational costs of customer acquisition for PBs in future.

Though all the seven PBs are now operational, but complete financial details of performance is available for four to five PBs and that is for only of a year or two. Using the consolidated statistics of PBs published by RBI for the first time in its 'Trend and Progress of Banking in India', it is clear that the share of deposits in PBs balance sheet though low, have increased from ₹685 million (5.7 per cent of total liabilities) in FY17 to ₹4,382 million (9.0 per cent of total liabilities) during the FY18. In terms of financial performance, the PBs have registered net losses during FY17 and FY18 which is attributed to high operating expenses in the setting up of initial infrastructure. However, the

⁷https://main.trai.gov.in/sites/default/files/PRNo05Eng18012019_0.pdf

performance of PBs has shown signs of improvement over the year. The NIM has improved from 2.8 per cent in FY17 to 4.5 per cent in FY18 and the cost to income ratio that measures the efficiency of the system has come down from 272.7 per cent in 2016-17 to 142.2 per cent in 2017-18. In terms of business operations e-wallets has occupied the largest share (81 percent) in the total remittance business of payments banks during FY18. RBI has mentioned that during the first half of 2018-19, the PBs have continued to incur negative operating profit. PBs may take some more time for reaching a break even as they reach economy of scale with large customer base by offering their unique banking products. The stringent RBI norms have shattered the hope of early break even for PBs. However, in a welcome move, on October 29, 2018, RBI has allowed PBs to participate in the call/notice/term money market both as lenders and borrowers to enable these financial institutions to access short-term liquidity and handle maturity mismatches more effectively.

Hence, it is premature to comment on the performance of the PBs. Only when the operational performance of PBs are scaled up, and more data is available regarding financial and operational aspects of these banks, a more realistic assessment can be made. As PBs have preferred to enter a mature and troubled sector though growing in nature, they need to withstand tremendous pressure of competition. For their survival and prosperity, they need to focus on identifying revenue opportunities from adjacent financial and non-financial services by leveraging digital banking channels and utilizing the physical distribution footprint for services outside of banking and payments. However, strategic tie-ups between the commercial banks and PBs would bring a win-win situation for both and would be able to cater to the mass unbanked Indian populace with the aid of latest low cost fintech evolutions.

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Summary of Macro Research Project Overseas Research Fellowship Report

Title of Macro Research Project: A study on risks from Foreign Currency Exposure of Small & Medium Enterprises (SMEs) and their impact on Banks.

Researcher : Dr. Akhilesh Tripathi, Assistant General Manager, State Bank of India.

Year of Study: 2015-16

SMEs and small corporates are more vulnerable to foreign exchange risk, and knowledge of this field is not much as most of the previous studies have been concentrated on large firms. The established theory base provides a great depth of knowledge in this field; however, it focuses on large, established and multinational firms. Literature on SMEs/small corporates' studies on Foreign Currency Exposure (FCE) risks from the bankers' point of view have been found to be rare.

Over the years, Indian SMEs/corporates have been putting together strategies and processes diligently and largely successfully to deal with business and economic risks. However, they have found themselves unable in dealing effectively with risks arising from currency fluctuations. Volatility in foreign currency exposure, currency fluctuations have directly impact their bottom line. Especially, adverse currency fluctuations which not only impact their profitability but also operating efficiencies. With weaker capital base and tighter budgets than their counterpart larger firms, SMEs get more affected from adverse currency fluctuations. Adverse currency movements not only impact their balance sheet but also jeopardise their commercial strategy for international trading activities. Negative currency fluctuations also impact their bottom-line on making provisions on the items in FCE maturing or having cash flows over the period of next five years in compliance with the relevant Indian Accounting Standards.

This study explores various factors and variables of FCE Risks of SMEs, from bankers' point of view including relevant theoretical concepts and empirical applicability. It also discusses in detail the impact of unhedged exposure of SMEs/corporates. Effects of foreign currency exposure vis-à-vis adverse currency fluctuations are grave on the performance of SMEs especially those who prefer to keep their exposure unhedged. Their undesired efforts pose significant risks not only to themselves but to their banks and overall financial system also.

Key Findings

- Respondents SMEs/corporates are aware about the risks affecting their buying or selling price.
- Non-availability of adequate hedging products from the banks, unfamiliarity or less familiarity with the external hedging techniques/ instruments were the important reasons for not adhering to hedging techniques/ strategies by the SMEs. Forward contracts as most satisfying external hedging tool in managing their risks from their foreign currency exposure. Respondents shared that cancellation and rebooking facilities are the most satisfying aspects of forward contracts however, the banking and other cost associated attached were the reasons for opting out.
- Usage of various internal hedging techniques such as changing the product-market combination,

relocating manufacturing establishments, changing the input source etc. were found to be near impossible on ground reality for the SMEs/corporates of limited magnitudes.

- Many SMEs/corporates do not perceive currency risks as an important risk to consider and prefer to keep major portion of their exposures unhedged, wishfully feeling that in case of currency fluctuations losses they could absorb themselves.
 - Most of the respondent SMEs/corporates do not have advantage of natural hedge by their export proceedings whereby their currency risks on imports can be set off.
 - Most of the respondent SMEs/corporates do not often have enough resources and organisational structure to manage their foreign currency exposure risks. At times, they fail to anticipate the market loss and face survival problems.
 - Many respondents SMEs were found not well-equipped in using exchange traded currency and interest rate risks hedging instruments.
 - Most of the respondents SMEs were found to have a clear strategy for hedging currency risk given the availability of resources and capability to face such challenges as well.
 - Most of the respondents SMEs/corporates were found increasingly keeping their foreign currency exposure unhedged, deterred by the high cost of hedging and lulled into complacency by the rupee's relative stability in recent months.
 - Experts believe that while managing their currency exposure, the foremost objective of the entities should be minimising exchange losses followed by reducing volatility of the cash flows. Interestingly, for many respondents these were similar and there was no difference between these two objectives.
- Most of the participants suggested that banks in consultation with the trade and industry bodies should conduct forex awareness programmes on currency exposure management, especially for small corporates/SMEs. Experts from financial services and banking industry were also of the view that lending institutions may conduct such programmes from time to time, at least for their borrowal clients in collaboration with the agencies like CII, FICCI, state level industrial bodies for reaching larger audiences.
 - In wake of the exotic derivatives sold in the past by some of the private sector banks to their clients without explaining clearly the pros and cons of the same which resulted in considerable foreign exchange losses to them, many experts strongly opined that RBI should instruct the Public Sector Banks (PSBs) and Private Sector Banks (PvtSBs) to popularise various derivative products among their borrower customers as well. Experts from finance industry contended that SEBI, CCIL, NSE and/or any other government agency should develop a platform where the exchange rate forecasting data/ information should be collected and analysed to facilitate foreign currency exposure risk management to small corporates/SMEs.
 - Many stakeholders/partners/directors of the respondent SMEs/corporates were found having a firm hold liking for using derivatives for profit speculation instead of risk management and value maximization of the organisation.
 - Ownership concentration with respect to forex management decisions were found common in many respondents SMEs/small corporates. The relevant operating staff, handling day to day banking and other financial operations were

found neither having authority nor any incentive for taking extra mile in reducing currency risks for their organisation. They are also not normally well-equipped to use any hedging instrument to hedge currency and interest rate risks. Many SMEs were found not having a clear strategy to hedge currency risk is much more important given the availability of resources as well as capability to face such challenges.

- Experts opine that it is very necessary for exporting SMEs to clearly perceive forex risk. A few industry experts observe that as against the earlier days, when entities were run by inherited business acumen, social skills and experience, presently most of the SMEs/corporates are managed by the people both from senior and young generations. While senior people possess lateral thinking and business acumen, young generation persons possess technical skills and professional qualifications.
- Experts contend that now the time has come when this generation of industry owners, directors, top and higher management persons have to understand themselves the relationship between currency issues and their effective management. They need to find a clear and accessible insight into foreign currency through books, keeping a hawk's eye on the market and also seeking professional advisories from time to time.
- Presently, foreign currency transactions are undertaken in following four different markets, Spot, Futures, Options and Other Derivatives (IRS, FRA etc.) markets. These markets function separately but are closely interconnected. Respondents strongly felt that the need of developing a separate foreign exchange market on the lines of share and money market, especially to meet SMEs/small corporates' demands and expectations. Similarly, currency futures and options are presently traded in equity and commodity exchanges. There is also a need for separate currency exchange which caters to the needs of business enterprises, especially SMEs/Corporates by offering derivative products for hedging purpose only.
- Industry experts also suggest that let a single regulator should regulate all derivative products offered to business enterprises while managing their currency exposure. Presently, the authority of two regulators, viz., RBI and SEBI overlaps in certain areas – for example, OTC derivatives are regulated by RBI where currency futures are regulated by SEBI. This gives rise to a regulatory overlap leading to conflicts since RBI permits derivatives only for the purpose of hedging a risk but not for speculative purposes. But currency futures give scope for speculation. Regulation of all the aspects of currency exposure management by one dedicated regulator addresses these issues.
- Results of this study demonstrate that there are many reasons because of which SMEs avoid hedging. Greed for making profit instead of maximising value through derivative hedging make external hedging techniques favourable to SMEs. However, it is questionable as to whether the use of more external hedging techniques brings more benefits than drawbacks for SMEs. In this backdrop our study lacks detailed discussions on the use of hedging techniques for efficient management of forex risk by SMEs.
- Future studies may be extended on cross-selling, or mis-selling of various hedging products by the banks to their SMEs borrowe₹
- Replication of this study in different parts of the country, inter countries comparisons may provide

a useful means to advance the generalisability of the findings of the study. For example, empirical data in both developing and developed countries may provide comparative results about FCE risks of SMEs/corporates and their impact across different institutional environments.

- Further research on SMEs' forex risk management could be conducted from the perspective of decision making literature. The study thesis sheds new light on SMEs' hedging practices by taking into account the ownership concentration aspects for forex related decision-making process, however, we do not take into consideration any cognitive capacity of decision makers e.g. their traits, abilities, knowledge corridors, networks etc. which impact their decisions relating to forex risk management. Therefore, replication of our study from the perspective of causation and effectuation process in ownership concertation, risk aversion aspects of SMEs may break through

the clouds of new horizon in decision making in foreign currency exposure risk management.

- Summing up, the study results are expected to provide important contribution towards understanding the available strategies that can be used by small and medium entities to manage the risks associated with forex exposure. This study also gives insight on why they are used and how effective they are in managing the risks to SMEs/corporates are exposed. It provides insights by applying perspectives that are relatively novel in this area, albeit from established theoretical streams - namely, the resource-based view and determinants of forex risk management by SMEs from bankers' point of view.

The results of the study can be used to assist other SMEs in the import and export market to formulate their own forex management strategy.



Bank Quest Articles - Honorarium for the Contributors

S.No.	Particulars	Honorarium Payable
1	Invited Articles	₹7000
2	Walk-in Articles	₹4000
3	Book Review	₹1000
4	Legal Decisions Affecting Bankers	₹1000

Book : Systemic Risk and Macroprudential Regulations - Global Financial Crisis and Thereafter
Author : Dr. Rabi N. Mishra, Executive Director, Reserve Bank of India, Mumbai
Publisher : SAGE India
Pages : 508
Price : ₹1,445

Reviewed by: Mr. Brij Raj, General Manager, Reserve Bank of India.

The Global Financial Crisis, undoubtedly the most severe financial crisis since the Great Depression of 1929, revealed the limitations of the pre-crisis prudential requirements and other tools to preserve financial stability. Further, the inadequacies in anticipating systemic risks i.e. events having the potential to disrupt the entire financial system - and dealing with them were a major shortcoming of the pre-crisis regulatory and supervisory regime. Systemic risks were not under the radar of the regulators as microprudential regulation focused on the stability of individual institutions. Post-crisis, authorities around the world have strengthened financial regulation and supervision and also adopted a macroprudential orientation which focuses on the stability of the financial system as a whole and how it affects the real economy. Written in this backdrop, the book 'Systemic Risk and Macroprudential Regulations - Global Financial Crisis and Thereafter', is on a subject of great contemporary interest and according to the author the "book is an attempt to keep the crisis firmly in our memory as we chart a new period of stability".

The book discusses the causes and effects of the Global Financial Crisis, regulatory reforms that were undertaken for strengthening banks and financial institutions and the other structural reforms that were necessitated. The book also provides an in-depth insight into the various sources of systemic risk and a framework to manage the same through enhanced macroprudential regulations. The book has an excellent foreword by the renowned Prof. Benjamin M. Friedman of Harvard University and an insightful Introduction by the author. The book is divided into four parts and has ten chapters. Part I focuses on the Post-crisis Financial Regulatory Reforms (Chapters 1-2), Part II on Managing Systemic Risk through Macroprudential Policy (Chapters 3-6), Part III on Managing Financial Crisis (Chapter 7) and Part IV on Coordination in International Policymaking (Chapters 8-10).

While Chapter 1 deals with the regulatory reforms that took place for strengthening of the capital, liquidity, ring fencing of banks and resolution plans post the

financial crisis, Chapter 2 discusses other structural regulatory reforms that were necessitated post the crisis. Chapter 3 provides an in-depth insight into various sources of systemic risk and a framework to manage systemic risk by enhanced macroprudential regulation and its coordination with the monetary policy authority. Chapter 4 delves into the importance of an early warning mechanism in predicting the crisis, thereby helping in preparedness to prevent the crisis. Chapter 5 provides an insight into the importance of stress-testing at the macro level by financial sector supervisors and central banks, thereby helping to identify the weakest link and preparing adequate cushion for an uncertain stressful event. Chapter 6 further provides for various tools for macroprudential regulations that can be adopted by the policymaking institutions. Chapter 7 provides a standard operating procedure / policy toolkit for possible response to a potential financial crisis. Chapters 8-10 deal with coordination in policymaking wherein a case for better coordination among global financial policymaking institutions is envisaged. An insightful epilogue on the 'Potential Concerns for Central Banks' lists the potential risks in the financial sector lurking before the central banks to deal with.

In his inimitable and engaging writing style, Dr. Mishra creates a superb framework for the readers to understand the idea of Systemic Risk and Macroprudential Regulations to manage this risk. Macroprudential policy represents a paradigm change in the regulation of the financial system in the aftermath of the global financial crisis and the book describes the evolution of this policy with the help of excellent examples and real-world perspectives on the subject. The book has extensively utilised the academic work in this area which would be a boon to new students and researchers. In a Chapter on Early Warning Systems the author has also devised a threshold for 17 macro financial variables which behave well as leading indicators. This could help policy makers in the financial sector in devising effective early warning systems.

The book stands out for its excellent coverage of the subject and would be a useful guide for central bankers, regulators and policymakers. It would also be of interest to bankers, academicians and students with its well-researched and rich insights on the subject. The book has also received rich accolades from renowned former central bankers and accomplished faculty from both India and abroad. I would recommend this stimulating book to understand the topic of 'Systemic Risk' and how it can be addressed through 'Macroprudential Regulations' and also learn how to avoid financial crisis in future to facilitate building a safer financial system globally.

The views expressed are personal and not those of the Reserve Bank of India.



Scheme for Research Fellowship in “Banking Technology” (Joint initiative of IIBF & IDRBT)

Adoption of technology has changed the contours of banking. The Core Banking Solutions (CBS) opened new vistas. A customer no longer banks with a branch but with a bank. Banks, of today, have however moved beyond CBS and have embraced newer and emerging technologies like Big Data Analytics, Artificial Intelligence, Blockchain, etc. These technologies have ushered in a metamorphosis of change in the Indian banking landscape and are considered to be a creative force. Nevertheless, these emerging technologies are not without their challenges. Cyber security assumes critical importance as in an internet-based banking environment, cyber frauds can happen with global footprints. Research covering the above emerging technologies may therefore prove to be highly beneficial for the banks.

In the above milieu, Indian Institute of Banking & Finance (IIBF) and Institute for Development & Research in Banking Technology (IDRBT) have taken an initiative to jointly announce a “Research Fellowship in Banking Technology.”

About IIBF

Indian Institute of Banking & Finance (IIBF), formerly known as The Indian Institute of Bankers (IIB), is a professional body of banks, financial institutions and their employees in India. Since its inception in 1928, IIBF has emerged as a premier institute in banking and finance education for those employed as well as seeking employment in the sector, aiming for professional excellence.

About IDRBT

The Institute for Development and Research in Banking Technology (IDRBT) was established by Reserve Bank of India in March 1996 as an Autonomous Centre for Development and Research in Banking Technology. Over the years, the institute has positioned itself at the intersection of academia and industry by focussing on research relevant to banking technology and reaching it to banks through training, consultancy, publications and coordination of various bank technology forums.

Themes or Thrust Areas

The research fellowship in Banking Technology, a joint initiative of IIBF and IDRBT, aims to sponsor technically and economically feasible research projects which has the potential to contribute significantly to the Banking and Finance industry.

Research proposals are invited in the following thrust areas:

- Cyber Security
- Analytics
- Mobile Banking
- Emerging Technologies
- Payment Systems

Research Proposal:

The research proposal submitted should, *inter alia*, focus on the research objective/s, hypothesis, research design, methodology and execution plan of the proposed project.

Eligibility

Teams sponsored/identified by research organizations/institutes, as well as individuals working in Banks/Fin-Tech Companies/ corporates /research organizations/institutions having a proven track record, are eligible to apply. If the research is undertaken by individuals, the proposal should be routed through their organizations after taking requisite permission, wherever applicable.

The staff / faculty members of IIBF and IDRBT are not permitted to apply for the research fellowship.

Time frame:

The final research report should be submitted within a maximum period of six months from the time the project is awarded. In case of delay in submission of report, the award may be forfeited.

During the period of six months, the awardee can avail the infrastructural facilities available at IDRBT for a maximum period of four weeks. This phase which will be available twice during the six-month period, can be used by the

awardee to carry out his/her research, test the same in simulated conditions, interact with the faculty of IDRBT and with CTOs/CISOs of banks and financial institutions. IDRBT may provide suitable mentoring and guidance to the researcher for accomplishment of his/her project. IDRBT may also provide logistic support to the research candidate. Costs to be incurred in this connection will be borne by the researcher. Candidates may highlight in their proposal their tentative plan to avail the mentorship and facilities at IDRBT and how it will enhance their work.

A mid-term review of the project should be submitted within a maximum period of 4 months, which will be reviewed and suggestions for improvements made, if any, should be incorporated in the final report.

Evaluation:

Research proposals, which should be amenable for implementation on ground, will be evaluated in terms of its objective, relevance and methodology. All the research proposals will be examined for its suitability and the final selection will be made after the short-listed researchers make a presentation to the committee jointly formed by IIBF & IDRBT. Final report should clearly mention key action points for policy makers for implementing the project.

Research Grant:

The selected research project which carries a cash award of Rs.5,00,000/- (Rupees Five lakhs only) will be fully funded by the Institute. On commencement of the project, a part (25%) of the award money may be given by way of advance, based on the request of the researcher.

On completion of the project, the researcher will be called to make a final presentation of his/her work done before the committee jointly formed by IIBF & IDRBT. The committee may also include CTOs/CISOs of banks and financial institutions. The balance of the research grant will be disbursed only on acceptance of the final report. In case a report is found unacceptable during the final review, the research organization / researcher will not be paid the balance amount. In case, a research organization/researcher abandons the project mid-way, they would be required to refund the advance availed together with interest at the prevailing MCLR of the State Bank of India (SBI).

Research report:

It should be comprehensive covering all aspects described in the research proposal.

Submission

Applicant research organizations/researchers are required to submit soft copy of the proposals in English MS Word file along with a brief bio-data highlighting their experience in conducting similar research and forwarding letter from the employer at academic@iibf.org.in

The scheme is open from 15.10.2019 to 14.01.2020.

Applicants must mention following details on the front page of their proposals:

Name:	
Topic:	
Objective of Research:	
Designation & Employer:	
Correspondence address:	
Mobile no. /Landline no.	
Email ID:	
Qualification/s	

Hard copy of the proposals along with the above mentioned details should also be sent at:

**The Director of Academic Affairs,
Indian Institute of Banking & Finance,
Kohinoor City, Commercial-II,
Tower-I, 2nd Floor, Behind Kohinoor Mall,
Off. L.B.S. Marg, Kurla (West), Mumbai-400 070
Tel.: 022-68507000/68507033/68507011**

DECLARATION FORM

The Editor,

Bank Quest,

Indian Institute of Banking & Finance, Kohinoor City, Commercial II,
Tower I, 2nd Floor, Kiroli Road, Kurla (W), Mumbai - 400 070.

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Re : Publication of my article

I have submitted an article “_____” for
publication at your quarterly journal Bank Quest.

In this connection this is to declare and undertake that the said article is my original work
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Articles submitted to the Bank Quest should be original contributions by the author/s. Articles will only be considered for publication if they have not been published, or accepted for publication elsewhere.

Articles should be sent to:

The Editor: Bank Quest

Indian Institute of Banking & Finance,
Kohinoor City, Commercial-II, Tower-1, 2nd Floor,
Kiroli Rd., Kurla (W), Mumbai - 400 070, INDIA.

Objectives:

The primary objective of Bank Quest is to present the theory, practice, analysis, views and research findings on issues/developments, which have relevance for current and future of banking and finance industry. The aim is to provide a platform for Continuing Professional Development (CPD) of the members.

Vetting of manuscripts:

Every article submitted to the Bank Quest is first reviewed by the Editor for general suitability. The article may then be vetted by a Subject Matter Expert. Based on the expert's recommendation, the Editor decides whether the article should be accepted as it is, modified or rejected. The modifications suggested, if any, by the expert will be conveyed to the author for incorporation in case the article is considered for selection. The author should modify the article and re-submit the same for the final decision of the Editor. **The Editor has the discretion to vary this procedure.**

Features and formats required of authors :

Authors should carefully note the following before submitting any articles:

1) *Word length:*

Articles should generally be around 2000-3000 words in length.

2) *Title:*

A title of, preferably, ten words or less should be provided.

3) *Autobiographical note and photograph:*

A brief autobiographical note should be

supplied including full name, designation, name of organization, telephone and fax numbers, and e-mail address (if any), or last position held, in case of retired persons. Passport size photograph should also be sent along with the submission.

4) *Format:*

The article, should be submitted in MS Word, Times New Roman, Font Size 12 with 1½ line spacing. A soft copy of the article should be sent by e-mail to publications@iibf.org.in

5) *Figures, charts and diagrams:*

Essential figures, charts and diagrams should be referred to as 'Figures' and they should be numbered consecutively using Arabic numerals. Each figure should have brief title. Diagrams should be kept as simple as possible. In the text, the position of the figure should be shown by indicating on a separate line with the words: 'Insert figure 1'.

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Use of tables, wherever essential, should be printed or typed on a separate sheet of paper and numbered consecutively using Arabic numerals (e.g. Table-1) and contain a brief title. In the body of the article, the position of the table should be indicated on a separate line with the words 'Insert Table 1'.

7) *Picture/photos/illustrations:*

The reproduction of any photos, illustration or drawings will be at the Editor's discretion. Sources should be explicitly acknowledged by way of footnote, all computer-generated printouts should be clear and sharp, and should not be folded.

8) *Emphasis:*

Words to be emphasised should be limited in number and italicised. Capital letters should be used only at the start of the sentences or for proper names.

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01.01.2019

Dr. J. N. Misra
Signature of Publisher

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Sr. No.	Examination	Medium	Name of the Book	Edition	Published By	Price (₹)
32	Certificate Examination in Card Operations for Employees of I.T. and BPO Companies	English	Basics of Banking (Know Your Banking – II)	2013	M/s Taxmann Publications Private Ltd.	₹195/-
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73	Certificate Examination for Business Facilitators/Business Correspondents	Hindi	Inclusive Bbanking: Thro' Business Correspondents in Hindi	2018	M/s Taxmann Publications Pvt. Ltd	₹540/-
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